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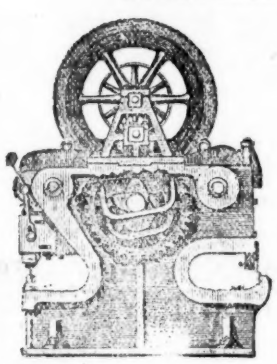

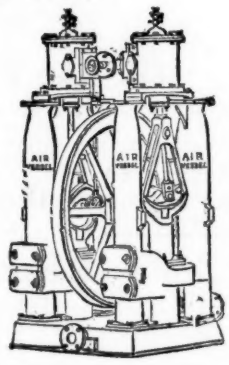

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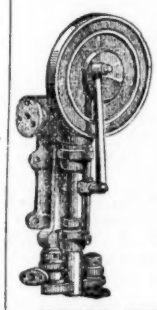

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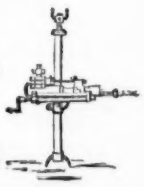

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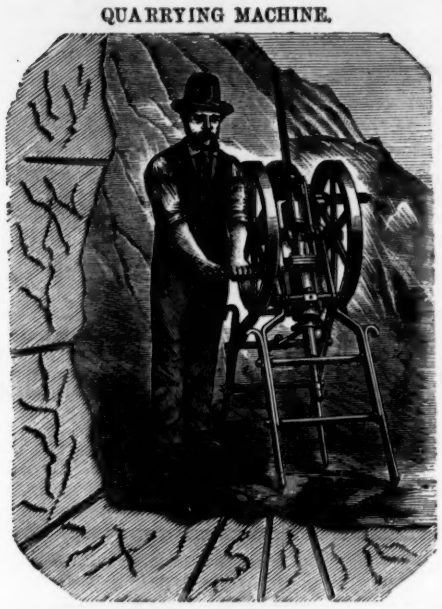

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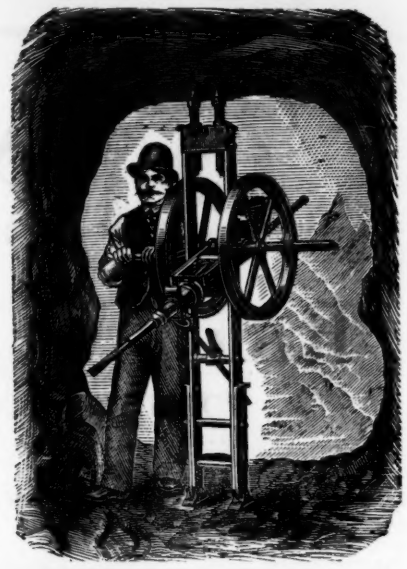

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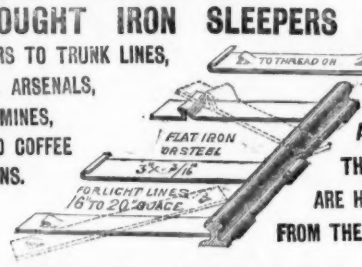

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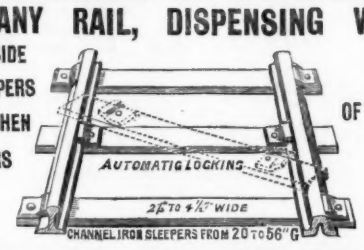

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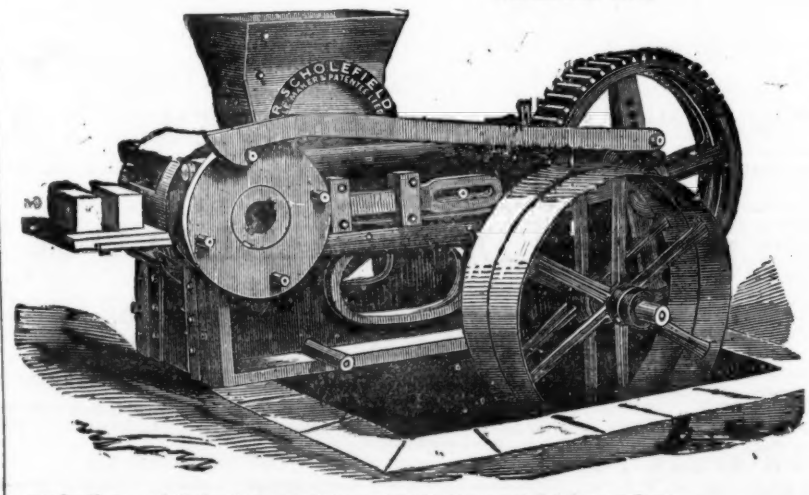

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Original Correspondence.

DEPRESSION OF TRADE, PROBABLE REVIVAL, NEW PROCESS AFFECTING STEEL MANUFACTURE, AND THE IRON MINING DISTRICTS OF THE UNITED KINGDOM.

The protracted and general depression encountered in the iron and steel trades, and, indeed, in every other branch of manufactures which depend more or less on these for success, has been keenly felt and deplored for a considerable time in the past not only in the United Kingdom but, to a certain extent, throughout the civilised world. Many large and influential firms have been obliged to close their works for a time, and some—not a few—have colapsed altogether, resulting from the adverse circumstances to which they have been exposed, and which have been brought about by causes the origin of which it is difficult to entirely define, and probably more difficult still to have avoided or set aside. Immense sums of money are consequently locked up in mining, iron making, and other manufacturing concerns, which are not only not yielding such profits or interest on the capital invested as it is reasonable to expect, but it is a well ascertained fact that in many cases where such concerns are kept going in prospect of realising improved trade an absolute loss has been incurred. The natural result of this state of things is that a continual loss cannot be sustained, and however painful it is to the proprietors of such works to be placed under the necessity of closing their works, still for their own safety it is their imperative duty to do so, although the result is a grevious one to the employers.

Under such circumstances as these any new channels which might be opened up to receive the raw or manufactured produce, or the introduction of inventions which are calculated to give a new and lasting stimulus to the iron and coal trades, producing labour for men and profit to employers, must be hailed with joy and welcomed as a great blessing. The inflated period now passed away produced mining and manufacturing adventure superabundantly, and it was considered that at that time much good would result from such speculations, but the impulse then given to trade was unnatural, and for a brief period only had the appearance of prosperity, but it carried with it influences having an opposite effect to those which were expected, resulting as a matter of course in the state of things as we have recently experienced and are still experiencing. However, a perfect balance in things seems to exist throughout nature, and if we get inflated and prosperous times the consequence is a corresponding depression. We must hope that the worst is over, and that we are on the verge of a more successful era, when wholesome trade and commerce will be restored. This would appear to be the case as far as the iron and steel trades are concerned, affecting especially, it is said, the Cleveland district, where a new process in the manufacture of steel has been introduced, but whether or not all the other mining district of the United Kingdom will be equally benefited is a matter which will have to be proved. Hitherto Bessemer steel has been made from iron smelted from selected hematite ores, because the injurious elements, not capable of being eliminated by the Bessemer process, were found to be at a minimum in that kind of iron ore; but now we have a new process invented, which enables the metallurgist to expel the deleterious elements from iron made from ores in which they are found at a maximum. These ores are consequently brought into competition with the hematite class. There cannot any longer exist a doubt as to the great value and ultimate commercial success of the Thomas and Gilchrist process of converting iron made from poor ores of the United Kingdom into steel of the first quality, for although the enemy to be encountered in its manufacture is nothing but phosphorus—and found in the greatest proportions in the shelly ores obtained from the Oolitic measures—it has hitherto baffled the ingenuity and enterprise of all those whose experience in scientific and metallurgical processes led us to expect that they of all others were best qualified to give a solution to the difficult problem. Not so, however, for the simple and masterly process to effect this great purpose was left to be worked out and introduced by two young metallurgical chemists hitherto unknown to fame. There is now no difficulty whatever in destroying or getting rid of the injurious element of phosphorus directly in the Bessemer converter by a single process as is now the case when hematite iron is used for steel. Hence a great advantage would appear to be conferred on those districts capable of producing ores at a cheap rate, as is said to be the case in the Cleveland, Northamtonshire, and other districts. Many of those metallurgists who have had considerable experience in smelting different kinds of ore consider that it is impossible to rid the iron of all injurious elements in the blast-furnace. It is, however, very difficult to determine what is actually impossible to be done in the great field of discovery, but what is required in such matters is original investigations by competent persons, not necessarily those directly connected with iron manufacture, because the energies of such gentlemen are to a considerable extent taxed already. It is unsafe to assert what may or may not be achieved by science in the future, and it is by no means certain that we are not fast approaching the period when steel may possibly be made in a more direct and economic manner from the blast-furnace.

It is a fact, not unworthy of notice, that in a general way inventors are dealt with much too lightly, and receive but very small consideration from those of greater experience and safer years. This was the case with Messrs. Thomas and Gilchrist, whose notions of being able to eliminate 99 per cent. of phosphorus from the iron directly in the Bessemer converter were entirely ignored by the members of the Iron and Steel Institute at their Paris meeting of last year. It is important and interesting to note that the new process, invented by Messrs. Thomas and Gilchrist, was practically tested and perfected at the Blaenavon Iron and Steel Works in South Wales. That district has, therefore, some claim to consideration from the commercial world, whatever profit may result to it by adopting the process.

One of the principal, and we may say all engrossing points worthy of our attention is whether or not the mining districts of the United Kingdom are likely to be affected, beneficially or otherwise, by the revolution soon to be expected in the iron and steel trades, consequent upon the introduction of the new process, but that is certainly a large question, which nobody can at present engage to dogmatise upon or determine with positive certainty. It is, therefore, preferable to go on generalities, and weigh matters calmly and considerately. It is said that the Cleveland trade of the future will entirely eclipse that of all other mining and manufacturing districts. It appears that where the Cleveland ores are found under the most favourable conditions the produce in metallic iron ranges from 31·42 to 33·62 per cent. The poorer sort averages about 18 per cent. The average, therefore, may be put down at 26 per cent. of metallic iron, and it is estimated that such ore can be placed at the furnace head at 4s. 6d. per ton, but the district is under the disadvantage of possessing an expensive land carriage for coke, which, as a matter of course, is a considerable set off against the cheapness of the ore. The clay ironstone of South Wales contains about 27 per cent. of metallic iron, and is more expensive to raise, but against this additional cost the Welsh have coal and coke on the spot in abundance, a consideration of very great importance. The Northamptonshire ore is poor in quality, but it can be produced probably at a rate of 30 per cent. cheaper than in the Cleveland district. Considering, therefore, that the fuel in the great coal basin of Warwickshire may be utilised for the purpose of smelting these ores, it is not by any means certain that the preponderance of trade will in the future be on the side of Cleveland. There are many other districts in which poor ore exists, and no doubt these will receive their share of attention from parties interested in the steel trade.

We must not omit to note the oolitic ores in the neighbourhood of Westbury, near Frome. The smelting works there were considered to be struggling for a considerable period against the hematite pig producers, because of the low percentage of the ore treated, and from the unsuitableness of the iron for Bessemer steel, but doubtless a new impulse will be given to those works. The extraction of the ore is easily effected, for it is only a question of removing the subsoil 5 or 6 ft. in depth in order to excavate the bed of ore below. The Cleveland ore contains as much as 22 per cent. of carbonic acid, and from 1·07 to 1·86 per cent. of phosphoric acid.

These substances are decomposed in the blast furnace, and the latter is associated with the pig-iron to the extent of from 1¾ to 3 per cent. It has been sought to remove this injurious element during the process of converting the iron into steel, and success has so far attended such efforts as to reduce the phosphorus to 0·154 per cent., but by the new process, invented by Messrs. Thomas and Gilchrist, it is stated that it can be reduced to 0·02 per cent., yielding steel of a very superior quality. Other processes to effect the same purpose are upon the *tapis*, by which it is believed that pig-iron containing phosphorus of 1·50 per cent. can be reduced to 0·005 per cent., which would give steel of a still further superior quality. The name of the well-known Forest of Dean metallurgist, Mr. R. F. Mushet, is, we believe, associated with this invention.

It is highly desirable that hematite iron producers should take such startling facts as these laid before them into serious consideration with a view to be able to compete and retain their place in the market, but unless they can manage to produce iron for steel purposes on such a cheap scale as will enable them to do this successfully, it is to be feared that those who cannot avail themselves of the poorer and cheaper ores will eventually be under the necessity of utilising their works for other purposes, or close them altogether. Hitherto some of the great centres of iron and steel manufactures in the North of England have depended to a certain extent upon the hematite ore procurable from the Cumberland and Lancashire mines, but, consequent upon the slow development carried on, the supply was not sufficient for the demand. Some of these firms in the North of England, as well as a few in South Wales, have secured large tracts of hematite iron ore at Bilbao, on the north coast of Spain; others, too, have sought supplies of hematite iron ore from Algeria and places more remote. The ores of Spain can be obtained in large quantities, and the royalty dues to the Spanish Government previous to 1876 was only 5d. per ton, including all export duties, but afterwards the rate was reduced to 1½d. per ton, which enables consumers to import the ore to the Tees and Tyne at 17s. per ton, about the price which is paid for the native hematite produced in the North.

In the South of England Spanish ore can be delivered for 12s. 6d. per ton. The Welsh district is, therefore, more favourably situated than their competitors of the North. From many analyses we have examined of the Spanish ore, we find that the average percentage of metallic iron ranges from 55·22 to 62·50; the peroxide of iron was from 79·03 to 82·28 per cent., without any traces of phosphorus. The stores of hematite ore are practically unlimited in many parts of the world, as the collection of minerals at the late Paris Exhibition illustrated. Among the countries where this kind of ore is found in the greatest abundance we may mention Sweden, Norway, Algeria, Egypt, Turkey, Canada, Russia, Spain, Portugal, United States, and many parts of Africa recently explored. With the exception of Spain and Portugal perhaps the most accessible place is Algeria, the ore of which may be better utilised by France than England. The ore there contains 58 per cent. of metallic iron, with 2·20 per cent. of manganese. One of the specimens exhibited in the Algerian Court contained as much as 90·70 per cent. of oxide of iron. There are, however, stores of hematite iron ore nearer home. These cannot be utilised by the northern manufacturers, but they are of great importance to the iron and steel makers of the South of England. Among the most important places producing this kind of ore may be mentioned Devonshire, Cornwall, but more especially the Forest of Dean. The ores of Cornwall have been more or less neglected as regards general development, not because of scarcity of mineral or low percentage of the ores, but because other supplies were to be found nearer to the point of manufacture. An analysis of the iron ore in the Perran lode gave a percentage of metallic iron from 52·30 to 56·14. The phosphoric acid ranges from 0·60 to 1·30 per cent. An analysis of pig-iron made from the white spathose ore gave 1·20 per cent. of phosphorus. Royalty dues on iron ore are from 6d. to 9d. per ton, and it appears that the general cost of raising the ore in question is 10s. 6d. per ton, including freight to Wales of 2s. 6d. and also carriage to port of 2s. 6d. per ton. It might, therefore, be sold to the Welsh consumers at 12s. 6d. per ton, leaving a profit to the mineowners of 2s. 6d. per ton. Of course, to encourage the general development of the hematite ores of Cornwall, and to meet the exigencies of the times, mineowners might content themselves with 1s. per ton profit, or double the amount of the royalty dues, and so give the ore to Welsh smelters at 11s. 6d. per ton, which would be a reduction as compared to the price of Spanish ore. It is possible that by proper arrangements, good management, and economic carriage that the price of Spanish ores may be reduced below the present price. The times will not admit of large profits, and, therefore, to induce trade it is a question of reducing profits to a minimum all round. The hematite ores of the Forest of Dean have been worked more or less from the time of the Romans; the outcroppings of the ore are well defined around the entire basin; its area, therefore, is well known, and has been ascertained to be about 25,000 acres. The coal measures are inside the iron ore croppings, and have an area of about 20,000 acres. The bulk of the ore raised from the Forest mines has been smelted in the district, but in some cases some of it has been sent to Wales. The greatest depth yet attained on the eastern side of the district is at Shakemantle, where Mr. Crawshay has established an extensive pumping station. The exhausted area of iron ore is confined to a narrow belt surrounding the Forest, immediately adjacent to the outcroppings, the average horizontal distance being probably no more than 200 yards from the outcroppings. The bulk, therefore, remains to be developed.

The yield from some of the mines has been as much as 20,000 tons per acre, but in a general way an average yield may be taken at 10,000 tons per acre in the great limestone vein, which does not include the sandstone and lower limestone veins. Many adverse opinions have been expressed as to the future productiveness of the district, but those who know best about it hold different views, and among others we have that eminent geologist the late Sir Henry de la Beche. He says, "The Dean Forest section of the carboniferous limestone series presents us with an interesting local accumulation of peroxide of iron, intermingled with the calcareous deposits of the time, so that we should regard the iron as having constituted as much a portion of the rock or deposit in a particular part of the general series as any other marked beds. It has long been extensively worked, so that its mode of occurrence is well understood. It ranges in variable quantities, but always in its relative geological position, cropping out round the basin-formed mass into which the beds of the Dean Forest have been forced. Though hematite ore is known elsewhere among the carboniferous rocks of South-Western England and South Wales, in some localities having been raised in large quantities, it has hitherto in them been only detected in veins, cutting the beds like many other mineral veins. In endeavouring to account for the position of the iron ore in the Dean Forest we may, from existing knowledge, infer that the peroxide was thrown down from water in which the iron had previously been in some soluble form spread over a great space. This is evidence of a positive kind, backed up by the experience of those who have worked the ore since Sir Henry Beche's time, that the ore is distributed over the entire Forest basin in sufficiently large quantities to justify further adventure.

Many of the deposits of ore have been found as much as 14 yards in thickness, although a certain gentleman has chosen to state that the ore is found in the crevices of the rock. This gentleman, from his connection with the Forest, might have had a special reason for making this statement, but who can reconcile mere crevices of the rock with *caverns* filled with ore 14 yards in width (*i.e.*, thickness)?

Many thousands of tons of ore have been raised for 2s. 6d. per ton. Dr. Percy has given a series of analyses of the Forest ores—*i.e*, 57·85—62 86, and 63·04 per cent. of metallic iron in the raw ore. In calcined ore it is 64·77 per cent. of iron. The grey ore on the western side of the district contains from 22·93 to 34·46 per cent. of metallic iron. The yield of phosphoric acid in the ore is 0·09 per cent., which is a minimum as compared with other ores.

The iron smelters generally mix the rich and poor ores together, so as to produce about 50 to 55 per cent. of metallic iron. The general charges for raising the ore in bulk from the mines of the district has not exceeded 4s. 6d. per ton. In some few cases it has been 5s., but when the bulk of the ore has been taken out of the mine and its working is continued the price of the scrapings would amount to 9s. per ton or even more. Considering that Dean Forest is capable of yielding a very large—indeed, we may say immense—quantity of first-class ore for a long time to come upon proper development, and that it can be raised at a reasonable cost per ton—much less, in fact, than that paid by the Welsh smelters for Spanish ore—and that fuel is abundant in the district, it is not very difficult to foresee that it is possible under certain conditions for the Forest of Dean to be able to retain the trade it has so long enjoyed as producing the best iron in the United Kingdom for the purpose of conversion into Bessemer steel and tin-plates. There are plenty of authorities on this point, and if the testimony of others were wanting we may mention that of Mr. R. F. Mushet.

The ores of the Oolitic measures are generally poor and hard to smelt, more difficult, in point of fact, than hematite ore, because the latter is sellular in structure, and, consequently, requires less fuel than the former. The Cleveland ore cannot be put down on a general average as producing more than 26 per cent. of metallic iron, and as it would require 2 tons of Forest ore, at a little over 50 per cent., to make 1 ton of iron it would require 4 tons of Cleveland ore to make a similar quantity. Now, supposing for the sake of argument that the extraction of the Forest ore in bulk is put down to be as much as 8s. 6d. per ton—too much for it by 2s. 6d. per ton at least—and the Cleveland ore at 4s. 6d. per ton, as it is stated to be, we should have 17s. as the price of 2 tons of Forest coal, as against 18s. as the price of 4 tons of Cleveland ore. The carriage of the coal to the iron-works converting the Cleveland ore must also be considered, because it would take double the quantity of fuel or more to smelt 4 tons of Cleveland as against 2 tons of Forest ore, so that the advantage seems to be on the side of the Forest. Then, again, the cost of labour in handling double the quantity of minerals and getting rid of the scoria would make the coal more than when the ore has a higher percentage. The Forest proprietors and iron smelters will, however, have to advance with the times, and apply every economical plan within their reach, with a view of reducing the cost of labour and production. This is, consequently, a fitting opportunity for the Forest proprietors to combine together in order to procure from the Crown better terms in mining than they are now enjoying. It is very necessary to revert to this circumstance, because the Crown, as Lord of the Manor, might so far impede progress by the great burden they impose as to materially hinder and permanently damage the future development of the district.

Prior to 1867 the royalty to the Crown and tonnage dues were fixed at reasonable rates, but soon afterwards the tonnage dues were raised to 5d. per ton on the grant of a small area of some 300 acres or less and a dead rent of 75*l*. per annum. Recently, however, the tonnage dues have been fixed at 1s. per ton and a dead rent of from 250*l*. to 300*l*. per annum for the grant of gales having an area of from 300 to 490 acres. The Crown have set up, as Lord of the Manor, that they have a right to one-fifth of all profits accruing or to accrue from the minerals, and this has been enforced since 1841. In many other parts of England the royalty is only one-tenth or one-twelfth of the profit. A sufficiently good reason ought, therefore, to be assigned why the Crown claims as much as one-fifth. Pressure should be applied with a view to its reduction. No doubt a great struggle would ensue between the Crown and the mining proprietors and iron smelters, but a well directed combination and agitation would produce beneficial results. It would be a far wiser thing on the part of the Crown to accept one-tenth or one-twelfth profits than to run the risk of obtaining a less income from high tonnage and royalty dues, or, perhaps, in the course of a few years no income at all.

There is no reason why a new law and rules and regulations should not be instituted to effect the reduction suggested. Some few years since the Crown endeavoured to impose more stringent measures upon the proprietors, who opposed and finally succeeded, but did not ask sufficient. If they had demanded more it would have been conceded to them. This is, we believe, the first time that the point referring to the large proportion of profit received by the Crown from high tonnage dues has been raised, but we hope it will be taken up by those interested and brought to an issue. In 1867 and since that date the Crown has considered that this one-fifth right possessed enhanced value, which, if true, it would follow that the galee or proprietor's profit would be 1s. 8d. per ton, but in 1871 and 1872 it was assessed at 4s. per ton. One of the great hardships to be endured by those who are interested in the other four-fifth interest to the minerals is that the Crown officials are so imperative that they do not allow any such person to have any voice whatever in determining how much the tonnage dues shall be, consequently it is wholly in the discretion of one man, who may or may not be a sufficient judge as to the amount to be assessed. Grants of gales have been made under the conditions that they should be *bona fide* opened in four years, otherwise they must be given up.

Formerly, however, the grantees were allowed to hold them by paying the dead rent after the time specified, but now the Crown has made a practice of over-riding all principles of equity and justice by forfeiting such properties as have not been opened, although a large sum of money has been expended and received by the Crown as dead rent upon them. The time, therefore, has arrived—as our friend the late Mr. Thomas Sopwith said when discussing this matter with us not long since—for the Forest proprietors to insist upon new laws and regulations, such, indeed, as would give greater facilities and confer upon them better conditions. It was never contemplated by Mr. Sopwith that the rules and regulations made to suit the condition of the shallow mines of 1841 should apply to the deeper mines of 1879 and those of the future; the idea in itself is preposterous.

Too much discretion is vested in the office of gaveller, who is the representative of the Crown. It is true, however, that the gaveller is altogether in the hands of his subordinate, the deputy gaveller, whom it is intended should be a practical mining man. The practice of those subordinates seems to have been conducted with considerable laxity, and this has produced another infliction upon the district, which we will endeavour to explain. It was intended that all gales should have an area sufficient to justify the amount to be spent upon them, and this calls for due consideration and proper judgment, but can it be said that such powers have been exercised when we find that grants of gales having the small area of 300 acres, at a depth of 350 or 400 yards, have been made, and can it be said that the minerals contained in such a limited area at that depth will justify the necessary expenditure in developing them? We say emphatically, No! and the gaveller in his discretion ought to have known so too. Now, this view of the case as being against the Crown is easily proved, for if we allow the greatest amount of minerals per acre—*i.e.*, 15,000 tons, which is the maximum quantity that can be expected to be yielded from a mine for 300 acres, we should have a duration of 75 years at a reasonable output of 200 tons per diem, or 60,000 tons per annum. The depth being from 350 to 400 yards, it would necessarily occupy from 3 to 4 years to win at an outlay for expensive pumping station and other plant and works a sum of not less than from 100,000*l*. to 120,000*l*. When royalty and tonnage dues are fixed they extend to a period of 21 years. Taking, therefore, the Crown officials' judgment of the value of their one-fifth profit in 1867 and 1879 as representing 5d. and 1s. per ton, we should have an average of 8½d. per ton, and consequently a profit to accrue to the galee or proprietor of 2s. 9d. per ton. This on the yearly output mentioned would give an income of 8250*l*. per annum, and to the Crown, 1650*l*. per annum. But such mines have to be developed, and this income will not accrue to the proprietor or galee until the expiration of three or four years, taken up in the development, as the case may be; it is consequently a deferred income. For the great risk incurred in mining, and to cover all contingencies—supposing such a mine were to be sold under such conditions as those mentioned, a purchaser could not be expected to accept less than 20 per cent. on the capital invested—giving him the opportunity to redeem his capital at a practicable rate, the present years purchase for four years deferrence, according to an acknowledged authority, would be 23,678*l*. The present gross value of the mine would, therefore, amount to 19,534*l*. If, however, the full profit of 4s. were to be realised on each ton, as assessed by the Crown, the present gross value under the same conditions would be 28,413*l*. To render it possible to pay any ready money for a mine, the calculated value must be in excess of the estimated cost of development, when the sum for development has been properly treated, the excess in value above this would be the purchase money to be paid for the mine. However

in this case we have a present gross value of 28,413*l.* against an expenditure of 100,000*l.* at least.

It is clear that in order to be able to pay only 1*l.* purchase money the present gross value, as calculated, must be 100,001*l.*, leaving 100,000*l.* expenditure for developing the mine, stand without the special treatment referred to, which under other circumstances it would have to be submitted to. A mine similar to the one we have been discussing is, as we have shown, worth no purchase money at all, which is the unfortunate condition of many of the mines in the Forest of Dean. This arises by means of existing arrangements and practice. What was formerly and is now required is that, at such depths as those referred to, the grant of large areas, small dead rents, and tonnage dues, and more time allowed for developing the mines, or sale, before any payments became due to the Crown. If the Crown will not consent to such a course, then they ought to buy up the other four-fifths interest of the whole Forest, and so become sole proprietor of the entirety. The value of a mine depends on its duration, and the output it is capable of yielding over the whole period, which should be large, of course. When a pumping station has to be established at a great cost, the area ought to be sufficient for a dozen extracting shafts.

If instead of 300 acres each future gale, or grant, were to be made 3000 acres, with easy terms, it would be a more reasonable thing, and there would be a chance of procuring other capitalists to spend their money in unwatering and developing the district. Closely connected with this question is the general drainage of the Forest, to the cost of which the Crown *should* contribute a large sum. The Forest would then have better prospects, but all the Crown has done since 1841 is to receive the dead rent and tonnage dues, without ever spending one farthing in its development.

The Crown should see that if the iron ore deposits are not more generally opened up and utilised, concurrently with the coal beds, the exhaustion of the latter before the iron ore will render it of no value at all, unless those living at that time choose to import coke and coal from Wales, which it is not likely they could do and compete with the state of things as they will then be found. If, therefore, a new state of things is not introduced immediately, and greater encourgement given for developing the Forest and so produce a large revenue to the Crown, it will in the future amount to *nil*. Those who are in Government offices and receiving good salaries may probably laugh in their sleeves when they read this description; but do they ever consider that they must be held accountable for producing those detrimental effects which we have referred to, and which will assuredly present themselves in the future?

THE HAULING OF COAL UNDERGROUND.—No. II.

SIR,—On May 28 a visit was made to the Herrington and Dorothea Pits, these being a part of the Earl of Durham's extensive collieries in the Houghton district. At the Herrington Colliery there are two pits, 145 fms. in depth to the Maudlin seam—the seam now worked—but the pits are sunk much further to the Hutton seam. The erections at the surface of this colliery are in the most modern style; the head gear, heapstead, and screens being all of iron and of great strength. The south or downcast pit for drawing coal is 14 ft. in diameter; the north pit is 15 ft. in diameter, and is used solely as an upcast for the furnace placed in the Maudlin seam.

Our object being to describe the system of hauling coal at these collieries, it may be stated there are five distinct methods of conveyance in operation:—1. By locomotives, in which compressed air is used as the motive power.—2. By endless chains, with and without engine power.—3. By engine, with main and tail ropes.—4. By self acting incline.—And 5. By horses.

The dip of the Maudlin seam is generally towards the east, the gradient is undulating, varying from level to 4 in. per yard to the east, and sometimes dipping in the contrary direction. In consequence of these heavy gradients the work was too severe for horses, and this has led to the introduction of locomotives actuated by compressed air on the main roads, as well as to some extent in the workings, to do the work usually done by putters and ponies. The idea of using compressed air as a motive power for conveying coal underground has for the first time been put into practical form at these collieries under the direction of Mr. William Lishman, the manager, and Mr. Young, the engineer, of Bunker Hill, near Durham. The system has so far proved highly successful, and is likely to supersede very soon both horses and ponies at the two collieries in question. It is, besides, in course of being introduced at other collieries belong to the Earl of Durham.

In describing the system we will begin with the temporary air-compressors placed at the top of Herrington pit. The steam-engine has two 22-in. horizontal steam cylinders, 3 ft. stroke. It was used as the sinking engine for the upcast pit. The gearing and rope-roll are still retained, but the engine, with the addition of an air cylinder behind each steam cylinder, is now utilised for compressing air. The right side air cylinder is 24 in. in diameter, and compresses to 45 lbs. per square inch—the same pressure as the steam; the left side air cylinder is 17 in. diameter, it receives the air from the other cylinder, and compresses up to 200 lbs. per inch. The air at this pressure is stored in a receiver on the outside of the house, whence it is taken down the pit and along the main road by 6-in. pipes.

The results obtained as to economy and efficiency, although highly satisfactory, are, however, not sufficiently accurate to justify a detailed statement of the cost. This is due almost entirely to the conditions under which the air-compressing engine is working, and to its construction being anything but suitable for the work for which it has been modified. With suitable air-compressing machinery and boilers, and convenient modes for distributing the air and stand pipes, the cost should not exceed 1½d. per ton per mile, as compared with over 3d. for horses.

The following is a short description of the locomotives as a first essay, but it is intended to supplement this portion of our notice by a more complete and detailed account in a future article.

There are now two locomotives working from the bottom of Herrington Pit, where horses were formerly employed. They are similar in size; each has two cylinders 3½ in. in diameter, 6 in. stroke. The air tank or receiver has a capacity of 20 cubic feet, and its weight in working order is 18 cwts. The engine is mounted on 12 in. cast-iron wheels, and stands about 3½ ft. high, taking little more room than ordinary wagons of 7 or 8 cwts. capacity do. These engines run from the pit to two stations, one run being nearly level 300 yards in length; six tubs are taken in and out: another being 340 yards further, and there is a rise in the first part of this distance of 2½ in. per yard. In this run of 640 yards only three tubs are taken in and out by the smaller locomotives. The pressure in the boiler is 200 lbs. in starting from the pit. The maximum speed is not less than 12 miles per hour. Owing to the limited size of the tank fitted on to the smaller locomotives they cannot run 640 yards with six tubs, only 3 tubs are taken inbye, and they return to the pit with three full ones before being again charged with compressed air. The charging with air only occupies half a minute. The run of 640 yards with three tubs can be made in and out in five or six minutes, including stopping at the inbye end. Take six minutes, the average speed will be 7½ miles per hour. The boiler can be recharged in coming out if required at a branch pipe about half-way. The air-pipes are cast-iron, 6 in. diameter, jointed with gutta-percha weases. The road is here single; the gauge is 2 ft.

An underground road from the Herrington Pit proceeds west to the Dorethea Pit, a distance of 1400 yards, the average rise being about 2 in. per yard westward. Only a portion of this road is used for conveying coal at present, but air pipes are laid along it to the Dorothea Pit, from thence up an incline (self-acting) in a direction south 25° east; length, 250 yards. This incline has an average rise of 1½ in. in a yard, and 18 tubs are run at once. The capacity of each is 8 to 9 cwts.; wheels 12 in., of cast-steel. The rope is ½-inch cast-steel, horizontal sheave 6 ft. diameter, with brake all round. Sets of twelve tubs and even six can be run on this incline at a lower speed.

The main road proceeds 850 yards further than the incline top in the same direction—So. 25° E. The gradient here varies; there are three distinct summits, making six banks to ascend and descend in each direction. The heaviest gradient is 1½ in. to a yard rise outbye from the extremity. On this length of 850 yards horses were used some time ago, but this is now done by locomotives at a great saving of severe horse-labour, and at reduced cost. There are four engines now working on this length, and two spare ones. Three of these have 3-in. cylinders, 6-in. stroke, 20 cubic feet capacity. Two have 3½-in. cylinders, 6-in. stroke, 25 cubic feet capacity. The weight of these varies from 18 to 20 cwts. One has 3½-in. cylinder, 7-in. stroke, 30 cubic feet capacity, weight 28 cwts. This differs from the other five in being fitted with reversing gear. The wheels are 12-in. diameter in all. The large engine not only has the advantage of running a longer distance, but from its greater weight is able to take much heavier loads, and by increasing proportionately the size of the receiver a run of one mile or more may be accomplished without stopping. In this instance the boiler is charged with air at 200 lbs. at the inbye end. About half way out there is another branch pipe where it is re-charged; at the outbye end there is another branch pipe, but this is seldom used. The pressure is supposed to be 100 lbs. in the boiler when the engine arrives at the outbye end, which is sufficient to run it back again with the empty tubs. There are two lines of rails—one for full and one for empty sets. The number of tubs in a set is from three to five. The shortest time in running in and out is 7½ minutes, the distance one mile, or an average speed of eight miles per hour, including stoppages.

It may be observed here the length of pipes from the Herrington pit to the extremity of this road is 2500 yards; about one-third of this length from the Herrington pit has 6-inch pipes, one-third more has 5-inch, and the remaining one-third to the far end of the locomotive road in the Dorothea pit has pipes of 4 inches in diameter. At a distance of 500 yards further is a double-acting horizontal pump driven by compressed air; the air pipes to this are only 1 inch in diameter. The pump is 3 inches in diameter, 8-inch stroke, and is worked day and night, forcing water to the Dorothea pit in 2½-inch pipes. The engine, No. 11 (now being constructed), has two 3½ inch cylinders, 8-inch stroke, 50 cubic feet boiler capacity, and will weigh over 54 cwts; it has reversing gear, and 14-inch wheels—with this, much longer runs will be accomplished than with the small ones. The intention at first was to utilise the small engines for putting in the workings; they are not at present used in this way, owing to the severe gradients in most parts of the colliery—as much as 4 inches to a yard in some parts—but where the gradient is slight they will be again put to work, and it is believed with good results.

M. E.

THE LONDON COAL SUPPLY.

SIR,—The special Yorkshire colliery district Correspondent of a leading contemporary states last week—"Whenever the problem of water carriage from this district is solved the trade will not be dependant on Northern strikes for a temporary increase of business, as it is only the high rate by railway that makes the competition with the North in the London market so severe." Another hebdomedary contemporary, in a leader upon the actual position of the London coal trade, states—"The London coal dealers are little less than a Trade Union to keep up the price of coals. It is high time that this system (prudence deters my pen from repeating the highly accentuated of what) should be put down, so deeply affecting every householder." The highest official authority in the Metropolitan coal traffic stated before a Parliamentary Committee on March 15 last year:—"Fluctuations in the prices of coal in London are due to taking advantage of any opportunity to do so, to the benefit of the dealers." The system so exhaustively submitted by me effects a relative additional saving of 4s. a ton on the minimum saving of 6s. a ton so estimated by said periodical (permeating so extensively the miners of Yorkshire), making 10s. a ton. If we take the actual price quoted last week by three of your technical contemporaries, in lieu of 10s., the saving accruing will be 11s. 6d. a ton—and these are all highest class perfectly independent data.

The Great Northern Railway is so vitally affected, as well as the multitudinous interests directly and indirectly connected therewith, that no matter how legibly the guide-post may point out the road the heads of numerous parties whom the proposed system will so greatly benefit are turned away and remain callous, obscuring their visionary powers to its directions, as if a learned dissertation on some abstruse problem in higher mathematics, or on the disturbing influences at work amongst the planets as they move in their appointed orbits, were propounded to them.

Simplicity, the perfection of mechanism, dominates the entirety of the proposed system of transport. The railway toll to several shipping ports is patent to everyone, competitive water carriage being available in each case, not placing this undertaking at the mercy of either rail or canal charges. Based upon the highest official data from the chief coal port in the United Kingdom, the transport of coal from pits in Yorkshire costs less than the average rates in Durham and Northumberland to port of shipment, and the distance from the Humber by sea bears no comparison. The screw colliers are the ordinary steamers engaged in the coal trade, the only, but great, difference consisting in end-to-end hatches, enabling a much greater number of hydraulic cranes to be applied identical with those at present working, but with precited advantage, and permitting a much greater number of men in constant employment to load and discharge. The coals can be shipped in bulk, or optionally sacked at loading port. The steamers will discharge in the Stour, Orwell, and Medway, all three accessible in all weather and at all states of the tide, into decked lighters to be towed up to London, thus the sea-going steamers will not suffer the great detention inseparable from existing steamers from fogs, dark nights, and the intricate and extremely hazardous navigation of the Thames, collisions being of almost daily occurrence, from which the latest novelty in screw colliers has already suffered severely.

WILLIAM JOSEPH THOMPSON.

20, *Little Tower-street, June* 4.

PYRITES.

SIR,—I have read with interest the article on Pyrites, and also the letters from your correspondents W. F. Rickard, "Fieri Facias," and "Enterprise," which appeared in last week's Journal. In 1852 the consumption in the United Kingdom was about 100,000 tons of native pyrites for the manufacture of sulphuric acid; to-day the consumption is over 600,000 tons of pyrites, which is nearly all imported from Spain and Portugal. The following extracts from the reports of the International Exhibition of 1862 are interesting, as they are *apropos* of the subject:—"When the use of iron pyrites was first adopted in this country the whole supply of the ore was derived from the counties of Wicklow and Cornwall. At present (1862) considerable quantities of pyrites are imported from Portugal and Spain, and likewise from Belgium. The much larger percentage of sulphur in the foreign ores has in some instances occasioned the preferencee. The Irish ore seldom contains more than 33 per cent., whilst the proportion in the Belgium and Peninsular ore is generally 42 to 50 per cent. . . . Small pyrites cannot be burnt in ordinary pyrites kilns." Your correspondent "Enterprise" refers to the Hollway process, and a great deal has been written about this in the Journal. If it will do half of what it promises to do there is a great future for many mines which are at present in a bad way. It, therefore, behoves all persons interested in mining operations to combine in order to ascertain the facts of the case. If I have read the papers correctly, Mr. Hollway asserts—

1.—That he can smelt ores without employing carbonaceous fuel, except such as may be required to produce the blast.

2.—That the process is applicable to silicates, carbonates, and other oxides, provided sufficient sulphides are added to the charge to produce by oxidation the necessary temperature for the operation.

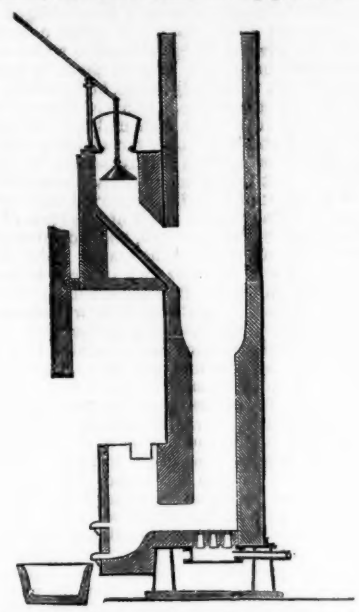
3.—*Vide* Chemical News, May 17: That if iron, lead, gold, silver, copper, nickel, antimony, zinc, arsenic, and sulphur are present in the charge the lead, zinc, antimony, arsenic, and part of the sulphur will be collected as sublimates, and the gold, silver, copper, and nickel will be obtained as a regulus. Part of the sulphur would be oxidised to sulphurous acid, and could be utilised for the manufacture of sulphuric acid.

I have simply quoted Mr. Hollway's statements for the convenience of your readers, and I conclude this letter by referring to that of your correspondent, W. F. Rickard, who informs us that "silver is not being worked beyond 70 or 80 per cent. of its assay value;" from this I understand that 20 to 30 per cent. of silver contained in ores is now lost, whereas Mr. Hollway claims to get out the whole of the silver by his process.

CHARLES KING.

THE HOLLWAY PROCESS.

SIR,—I am much obliged to your correspondent "Enterprise" for his kindly letter, and I enclose a rough plan of the furnace employed at the Atlas Works, Sheffield, which with some modifications may, I think, be found suitable for my process:—



1.—The diameter of the furnace should be very much greater, and all the tuyeres could then be placed towards the centre. In this way the wear on the lining would be greatly mitigated, because if sufficient silicious material were always present in the bath the oxide of iron formed would be converted into silicate of iron before it came into contact with the silicious linings, and it is well known that orthosilicate of iron has no corrosive action on silica.

2.—It might be advantageous to have the furnace broader at the base and narrower higher up, so as to avoid scaffolding, and to economise heat.

3.—To reduce the quantity of fuel required to produce the blast the air should be introduced at as low a pressure as is compatible with the upholding of the metal. This could be done if a large shallow bath of molten material was operated on, and provided sufficient air was introduced by means of very small tuyeres.

4.—If a shallow bath of molten material is operated on it becomes very important that the air should be introduced through small tuyeres, and the number of tuyeres must, of necessity, be multiplied in order to maintain the necessary temperature by oxidation.

I have thus given my views as to the furnace modifications I think necessary, and shall be glad if "Enterprise" and your other readers will give me the benefit of any practical suggestions which may occur to them.—*London, June* 3.

JOHN HOLLWAY.

REDUCING SULPHIDES WITHOUT FUEL.

SIR,—I have to-day received a letter from Mr. L. E. Holden, manager of the Old Telegraph Mining and Smelting Company, dated Salt Lake City, May 12, in which he refers to the value of my process for the deposits in that country, and adds—"There are endless amounts of pyrites on this coast, or, rather, in these mountains, that carry from 20 ozs. to 200 ozs. in gold and silver. I own one ledge which assays about 5 ozs. gold, 20 ozs. silver, 3 to 5 per cent. copper, 10 to 20 per cent. lead, and with plenty of quartz in the same mine which will carry 25 ozs. in silver, so, you see, if you require sand we here could furnish a rich sand and save the smelting of barren fluxes." Few know the mineral deposits of that district so well as Mr. Holden, I therefore venture to think that the information he gives may not be uninteresting to your readers.

London, June 3.

JOHN HOLLWAY.

A NEW PROCESS IN METALLURGY.

SIR,—With reference to the discussion that took place on May 30; and to Mr. France's statement that at the Society of Arts the crude sulphur he received contained 47 per cent. of sulphur, 24 per cent. of siliceous materials, and 28 per cent. of oxide of iron, I have just received from Mr. J. T. Merry, of Swansea, an analysis of the crude sulphur obtained at the experiment on April 8, which he sampled:—

CERTIFICATE OF ANALYSIS OF CRUDE SULPHUR.

I herewith hand you my analysis of the sample of crude sulphur taken from cupola B, Atlas Works, Sheffield, on April 8:—

On Crude Sulphur dried at 100°.

Sulphur	63·30	Copper	trace
Silica	7·00	Lime	trace
Iron	2·76	Magnesia	trace
Arsenic	7·12	Alumina	trace
Lead	8·95	Oxygen	trace
Zinc	2·74	Carbon and loss	8·13

JAMES T. MERRY.

Your readers will notice that the proportion of silica and iron found by Mr. Merry is much less than stated by Mr. France, and the reason is very simple. The crude sulphur Mr. France received from Messrs. John Brown and Co.'s works contained, mixed with it, some of the debris resulting from the jet of water in the condensing cupola B, washing down the old materials from the sides of the cupola which had been out of use for a considerable period.

London, May 27.

JOHN HOLLWAY.

ECONOMIC ALKALI MANUFACTURE.

SIR,—In the manufacture of a great many chemical substances, such as sulphuric, nitric, muriatic, citric, vinous, oxalic, or stearic acids, alum, iodine, and bomine, various apparatus made of lead are used. The softness and weakness of this metal are objectionable, and it is unsuitable where any considerable pressure is applied, and for vacuum or distilling apparatus. The object of the invention of Mr. William Thorn, of Montpellier, France, is to overcome these difficulties, and to construct boiling backs, crystallising pans, acid tanks, Montajus, vacuum apparatus, distilling apparatus, and other similar apparatus, and parts used for acid, fluids, or gases of lead, coated iron, or copper plates instead of lead, whereby a much more durable material is obtained, and one suitable for considerable pressure. The sheets to be coated are first cleaned in any suitable acid bath to remove scales or other oxide or other impurities; for iron, a thin muriatic acid solution, with a little zinc dissolved in it, is suitable. The plates are then well tinned in the ordinary manner, but only on one side of the sheet.

The so tinned sheets, in a perfectly clean dry state, are then placed perfectly horizontal, and surrounded with an edge or wall of sand, and in this position heated by any suitable heating appliance; an adjustable gas heating appliance is very suitable for the purpose. This heating is continued until the tin coating melts, and then molten lead is poured on in the thickness or quantity which is required, according to the purpose for which the plate is intended; the lead should be as free from oxide as possible. The metal is allowed to flow all over the tinned surface, and amalgamates with the thin tin coating. It is a necessary condition that the sheet

until the tin coating begins to melt, should be heated to about 430° to 450° Fahr. Small irregularities, which arise in the pouring, are removed by hammering, which gives the lead a greater density than rolled lead, and by rolling by means of ordinary sheet iron rolls, whereby at the same time the lead coating can be reduced to a minimum. Lead coated sheets so made may be worked in any way, such as bent, rivetted, hammered, without any separation of the lead from the other metal, and they are extremely lasting for the above-named purposes because of the purity and density of the lead. As required in some constructions of the apparatus, the sheets may be provided with overlapping lead edge. Apparatus which are to sustain a very high pressure, and which, because of the great iron or copper thickness, could not without damage to the strength of the metal be bent cold, may be coated with lead by the use of a mould or core placed in the manufactured apparatus, and by pouring the lead in between a space left between the plate and the mould or core.

The advantage of this apparatus will be obvious to all who have had anything to with the manufacture of corrosive chemical products. There are many cases in which it is essential that no metal but lead should be exposed, yet from the softness and weakness of the lead it is almost impossible to employ it. Now, it seems to me that this invention precisely meets the difficulty. The strongest bracket girders or anything else required can be constructed of iron, which will ensure both cheapness and strength, and can be coated with lead, which will effectually protect them from chemical action.

June 3. SULPHUR.

BOILER EXPLOSIONS.

SIR,—My friend Dr. Oxland informs your readers that he obtained "results so completely in opposition to the warning given" by me, that he has thought "it important to remove one of the obstacles to the proper consideration of the causes of the explosion of steam boilers." I am compelled to confess that I do not understand this. The only warning ever given by me was a statement of the remarkable phenomenon observed by the American chemist, the Belgian engineer, and the French chocolate manufacturer, and since frequently repeated as a lecture table experiment. The "Caignard de la Tour" state of matter has nothing whatever to do with the peculiar condition of water observed by these physicists, and which certainly demands further experimental enquiry. Since no amount of written or spoken words will settle this question, I would urge the importance of repeating the simple experiment of boiling water in a glass flask having a *very* long neck, and full of steam, to *prevent* the accession of air, carefully noting the temperature of the water when the ordinary condition of boiling is changed into the formation of spheroids of steam, and simple ebullition becomes violent bumping.—*June* 2. ROBERT HUNT.

THE DEPRECIATION OF SILVER.

SIR,—The Times of Thursday last contains a long article from a correspondent who signs "Cambist," the purport of which is to prove that the depreciation in silver is only temporary, the fall, according to the writer, being attributable to "the demonetization policy of Germany, the marked increase in the amount of Indian Council drafts, and the exaggerated reports of the yield of the silver mines in the United States, more especially those of Nevada," which he goes on to state are nearly worked out. As the existing depreciation in silver is imposing an annual loss on India of some three millions sterling the examination of the preventible causes is a question of the greatest moment. The letter published in the Times of to-day from its Francisco Correspondent virtually disposes of "Cambist's" theory of the assumed exhaustion of the American sources of silver mining. It is true, as stated, the yield of the Comstock for the three months of the present year falls short some four millions of dollars of that for the same period in the preceding year, but that may be due to one of the ordinary viscissitudes of mining, and the writer expresses his belief that the arrangements made with the Sutro Tunnel, and the commencement of the great shaft intended to go down 4000 feet, will probably bring the yield again up to its former average. New discoveries in America and elsewhere of rich silver-bearing districts point to an increased supply of that metal, and to a continued depreciation in its market price. It is clear, therefore, the preventible causes will be limited to political acts and commercial demands.

The Times of to-day records the conversion in America of Mr. M'Culloch, an eminent banker, to the bi-metallic currency principle, to which up to the present time he had been an opponent, and he gives as the reason for the change that until he had fully studied the subject he had not seen the great necessity for the use of gold and silver concurrently.

A memorial most influentially signed by London merchants has just been forwarded to our Prime Minister, calling for "enquiry into the effects on the world's commerce from the undoubtedly large contraction of metallic currency." This is an opinion I have long entertained, and have often publicly expressed. It is reported that the German Government is seriously thinking of retracing its steps in respect to its demonetisation of silver, which is bearing bitter fruit already, and will cause deeper distress the longer it is continued. It is hopeless, even if it were politic, to attempt to change or limit the world-wide use of silver as currency; and in the interests of commerce it is clearly advisable to abolish all restrictions on its use, and to make silver in this country a legal tender to any amount, by which means the increased demand would certainly raise its price, or at all events prevent the further fall in market value which may otherwise be expected.

June 4. JOHN ELLIOTT.

MANUFACTURE OF IRON AND STEEL.

SIR,—Although you have directed a good deal of attention to the Hollway process for the treatment of copper pyrites, I have not observed that you have made any mention of his iron and steel process, which appears to me to be even still more important. In the first place his improvements are for the production of crude iron with a consumption of carbon more nearly approaching the theoretical quantity requisite than is possible in the usual processes. He does this by blowing air through crude molten iron in the presence of metallic coke or oxide of iron and carbon, and by the utilisation of the heat obtained from the combustion of the carbonic oxide thus evolved. He adds from time to time additional metallic coke or oxide of iron and carbon, and is thus able to carry on a continuous operation. He employs in preference a basic lined vessel or furnace, having tuyeres so arranged that while he is driving air upward through the molten metal to oxidise the carbon and other metalloids contained within he also drives air downward into the vessel, and thus burns the resulting carbonic oxide. He utilises the heat from the escaping gases to heat the blasts of air, and he also regulates the respective quantities which he introduces in order to produce the heat requisite with the minimum consumption of fuel. The temperature he thus obtains causes the molten iron rapidly to take up carbon to replace that oxidised, and not only facilitates the reduction of the oxide of iron which is in contact with carbon or with the molten carbide of iron, but also fuses the iron as soon as it is reduced from the oxide; therefore slag is only a necessity on account of the difficulty in obtaining oxide of iron without admixture of foreign substances, and as he can employ oxide of iron in powder he can first free it as far as possible from impurities, and when desired make it into metallic coke.

The theory of the process is very simple. Molten iron, rich in carbon, is run into the vessel, the blast, in preference hot, having previously been turned on at both upper and lower tuyeres; iron ore, in preference in powder, mixed with coke or other fuel, is now charged into the vessel, and smelting sets in immediately. The ore introduced is thus subjected to a powerful reducing action by the incandescent carbonic oxide which is burning above the molten iron at a very elevated temperature. Carbide of iron is formed, which melts, and continually introduces carbon into the mass of decarburising iron. The iron is never decarburised, because of the constant accession of combined carbon, brought about by the presence of carbon and by the smelting of the crude materials introduced, the silicious and earthy constituents of which form a slag, which accumulates at the surface of the molten iron, and from time to time is run off. The gases which pass off will be mainly carbonic acid and nitrogen, which being at a high temperature will be utilised to heat the blast. The product will be run out of the furnace, or poured out at the mouth when occasion requires. In the second place these improvements are for the reduction of iron from the molten ferriferous slag produced from pyrites under his patent, March 21, 1878. When he desires to produce steel or iron he removes the sulphur present in the slag by oxidation, either by a blast of air or by the addition of oxide of iron, taking care to keep the mass molten and at a sufficiently high temperature. He employs a vessel or furnace having a basic or carbonaceous lining, into which he introduces the molten ferriferous slag after the oxidisation of the sulphur, adding carbonaceous materials, either in the gaseous or solid form; also the necessary lime and or other bases, and maintaining it fluid and at a sufficiently high temperature, either by the combustion of gases above its surface or by introducing carbonic oxide at a sufficiently elevated temperature. By these means the slag is kept sufficiently basic, and the oxide of iron is decomposed by the reducing substances introduced.

I need hardly explain that the essential importance of this process, like Mr. Hollway's copper process, is the enormous extent to which it economises fuel; just as he utilises the sulphur in the copper process, so he here utilises the carbon and coke, and equal success may fairly be anticipated. A. P. L.

MINING PROSPECTS ON THE PACIFIC COAST.

SIR,—As the new Constitution has been adopted by a majority vote of the people of California it will be necessary to sum up the effects likely to arise from this decision in a few words on mining interests in this State. Taken in its entirety, and if carried out in the radical manner in which it was conceived, it might deter capital from entering into mining operations, and might unquestionably in other ways injure all mining interests. The organic law of the land was altered, with a view to resist the many evils under which this State has for many years laboured from the greed of great corporations and the corruption of office-holders. The people of California hitherto have been most forbearing, and have suffered positive wrongs, which would never have been tolerated in any other save a despotic country; and it is no wonder that, having at length risen in the full might of their wrath, they have in some measure overstepped the boundary of prudence and justice. We are beginning only now to cooly examine the probable effects of this new Constitution (which does not come into operation before Jan. 1, 1880) on affairs generally. It is conceded by most intelligent men who have taken the matter into consideration that, much as the passage of many of its clauses and provisions are to be deplored, there are also many points to be commended in it, as certain to prove beneficial to the country at large. The most strenuous opposition was offered to its adoption, and very bad feeling and many hard words were used previous to its adoption. But people are now beginning to find that the threatened evils may be averted, if not entirely set aside. Those clauses which are opposed to Federal law or which are inimical to the recognised interests of the State will be treated as a dead letter by the Supreme Court, and a liberal interpretation will be given by the coming Legislature to those stringent conditions of the new Constitution which may appear opposed to the general weal. Some of these as far as regards mining matters can easily be evaded—for instance, the regulation referring to and prohibiting stock gambling and dealing on margin. Were the law after the 1st of next year to be carried out too strictly it is possible that some of the mining companies would disincorporate and reincorporate in Nevada, transacting all business through an agency in this city. Money, which decides everything in this country, will be freely used to set aside any injurious tendency or effect that may arise from the new Constitution. I have written thus much on the subject to relieve the minds of those abroad who might from reading our local papers be under the impression that the whole State had gone, or was likely to go, to destruction. Affairs will move in much the same way as heretofore, and no serious ideas of ruin and disaster need for a moment be entertained.

In a former communication I mentioned the astonishment of mining people here when they learnt that the Old Telegraph Mine of Utah was to be placed on the French Market at 15,000,000 fr.—as it is known to be, comparatively speaking, a worthless mine. But this astonishment was greatly increased when we learnt that the mine went off easily, and we can only pity the credulous ones who have sunk their millions without any prospect of a return. This was followed by another surprise from the same quarter, in the shape of a prospectus, issued in Paris by Messrs. Bouvier Frères and Co., advertising the sale of the Amador Volcano Canal, under the designation of "Cie des Mines d'Or et Canaux d'Amador Volcano (Californie) Anonyme, au capital de 5,000,000 fr., divisé en 10,000 actions de 500 fr." Of this one million dollars of capital 5200 shares are advertised for subscription at the price of 600 fr. each, or $120 per share, equal to $624,000 cash, leaving still in hand 4800 shares for the original owners. The Stock Exchange of this city remarks, in reference to this enterprise—"This is not such a huge wild cat as the Old Telegraph Mine, but is fully as vicious and dangerous." A friend of mine, an intelligent mining expert, said to me on this subject—"I am surprised that any man of ordinary business capacity, and with any reputation at stake, could be induced to sacrifice both by endorsing a scheme with so little merit. I have known the property ever since 1856, and also know that it does not pay an income beyond expenses amounting to the interest on $25,000, nor has that property a prospective value sufficient to induce capitalists to invest in it. It is well known here, and is classed as 'unproductive dead property'—it might possibly be considered a good investment at $10,000." The opinion of the so-called mining experts who endorse the value of the mine would not go for much here, where they are well known, and as for one of them his antecedents are such that his testimony in favour of any mine would prejudice it in the minds of anyone on this coast. As I have stated in another letter California gold mines are attracting much attention in the East. It is generally supposed that dividend paying mines, or those soon likely to pay a dividend, are the most suitable as investments; but such is not always the case, especially in regard to those mines which are put on the San Francisco Stock Board. The dividends are high, and give ample satisfaction for the time; but, unfortunately, they do not continue, but are usually followed by assessments. The bonanza mines two years ago, when paying dividends, were esteemed a durable investment; but the principal owners of the mines were investing in United States 4 per Cent. Bonds, and they were wise in so doing. In the same manner a year since the Bodie shares sold at an extravagant price, and were supposed to be inexhaustible, with never-ending dividends, yet these mines have not paid a dividend for some time past. Where money is to be made in mining is in those cheap and undeveloped mines which have perhaps been abandoned or neglected because of want of means to work them, and which often turn out immensely rich and profitable. Eastern people pride themselves on their superior acuteness, and have in the purchase of mines on this coast sent their experts to examine and report on them previous to investing. These experts it appears are as liable to make over-estimates of the value of mines as others. The first offering of 40,000 shares of the Horn Silver Mining Company's Stock in New York, at $15 per share, was taken up in a few days, and 25,000 shares, offering at $17·50, were subsequently taken. Their expert comfirmed the report that a large body of ore was in sight, having a net value of more than $17,000,000. As this is purely an Eastern scheme the bad results arising from such exaggerated reports must not be attributed to the intervention of Pacific Coast mining sharps.

There is ample room in California to those who have the intelligence and the means for the exploration and discovery of virgin mines, notwithstanding the extensive way in which the State has been worked for the past 30 years. Extensive purchases of mining property have lately been made in Arizona by Eastern capitalists. The first company incorporated in New York to mine in that territory was the Silver Nugget Mining Company in Maricopa County. The board of trustees includes the names of Gen. D. E. Sickles as president and the Hon. G. S. Boutwell (ex-secretary of the Treasury) as vice-president; the others are all men of scientific attainments and position. The Mineral Park and Keystone Mine of Arizona has also been sold in New York. The once famous Vulture Mine has been bought by Chicago capitalists, and an incorporation has been made with $10,000,000 in capital stock, under the designation of the Central Arizona Mining Company. Several mines in the Papago County have been bonded for $175,000 to some Pittsburg Pa. capitalists, who have made arrangements to expend several thousands of dollars in at once prospecting these mines. Numerous other instances might be quoted in which Eastern capital has been largely invested in the Territory. With the Southern Pacific Railroad at Maricopa Wells, 180 miles from Yuma, with the early prospect of its being carried through Arizona, and partly across New Mexico to the Rio Grande, the richest mining region of Southern Arizona will be fully opened up; and if it has one-third of the mineral wealth attributed to it by Americans and Mexicans it will not fail to attract a large influx of miners.

The grand centre of attraction, however, at the present time in mining circles appears to be Colorado, as thousands of people are already pouring into Leadville, where rich mines are continually being discovered, in spite of the snow and the inclement weather which now prevails there. As the spring approaches the rush increases. The Black Hills are almost depopulated, the greater part of the settlers in that region having apparently taken flight to Leadville, in which vicinity a large tract of great mineral wealth is known to exist. Mr. J. P. Jones, the United States Senator for Nevada, with a large party of friends, has departed for the same district, and the expression of his opinion will be looked forward to by all with great interest. He is not only a practical miner himself, but a man of more than ordinary ability. To his untiring efforts and consummate skill may be attributed the great prosperity of the State of Nevada, and he is unquestionably the most popular and liberal-minded man on the Pacific Coast. Had other rich men followed his example it is probable that they would not now be "squealing" under the infliction of a new Constitution. I am glad to be able to say that the vexed question of the Ruby Mine has at length been settled, full possession having been given by Heyneman to the company's representative on this coast. All credit is due to the untiring zeal and the indefatigable attention paid to the case by Mr. Bernard, who has fought the company's battles for many long years, and whose determination has at length met with its reward in his being able to restore this very valuable property to its rightful owners.—*San Francisco, May* 16. E. J. J.

MINING NEWS FROM UTAH.

SIR,—When I stated, on Oct. 10, 1878, that Holden obtained 15,000 ozs. silver in 30 days, I meant to say that he saved 15,000 ozs. of silver, which he formerly lost entirely. As to certain French correspondents beiug "surpris, et plus qui surpris," I must reply that I never stated anything but facts. I told the Credit National in my first, and in every letter, and tell them again—Beware! The plain fact in my report was, 374,000 tons of ore in sight; value at an average, $18 per ton. At a production of 3000 tons per month, profits at a maximum $25,000 per month. The 420 ft. level has a pyrites of iron flooring, and is bounded on the north-east face by a porphyry dyke, virgin ground, 2500 ft. in length. I trust that no person imagines that the vein is from the north-east to the south-west boundary all the way from 40 to 150 ft. wide! I wish for the interest of all that it may be so; perhaps it is, but I cannot see it. A mine is, or should always be, bought on ore in sight. No person acquainted with the Old Telegraph but must acknowledge that it is a very good mine, but probably not so good as some shareholders fondly imagine, as there is a great difference between one and three.

Salt Lake City, May 18. WILLIAM BREDEMEYER.

RUBY CONSOLIDATED MINING COMPANY.

SIR,—As a shareholder in the above, I was gratified at reading the remarks and letter in the last two issues of your valuable Journal in reference to this company. Should the information forwarded by a correspondent, and referred to by you in last week's Journal, be correct, as to the company obtaining possession of the machinery, appliances, &c., and taking into consideration the great value of the properties according to the report of Professor Raymond, mentioned by your last correspondent, the shares are certainly worth more than the quoted 1*l.* per 10*l.* share. The directors and those who have worked with them deserve well at the hands of the shareholders.—*June* 5. M.

RICHMOND COMPANY.

SIR,—The recent decision in the suit brought by the Emma Company against their metal brokers lays down the principle that "fiduciary relationship to a company is not confined to the directors or limited to events precedent to its registration." This legal dictum clearly affords the opportunity for obtaining some redress for the consequences of a grave error in connection with the original formation of the Richmond Company, which, if my information is correct, has been the real source of the subsequent litigation, frightful costs, and vital losses in mining rights, with further menacing contentions to encounter. If the evils which have resulted from the initial wrong have been due to imperfect judgment, condonation would be politic, but not so if owing to advice given from interested motives, concealed from those it was intended to influence.

May 29. AN OLD SHAREHOLDER.

THARSIS MINING COMPANY.

SIR,—What has become of Haselden and Gosse's action? According to their last statement it was to have been decided first week of May. As they are silent I infer my Derby prediction of the result turned out true, and that the Tharsis directors were justified in the cool and almost contemptuous way in which they spoke of the actions against the Huelva Company, the liability of which they undertook. For a little I was inclined to take another view—that the Tharsis directors had compromised the case, in order to have everything as comfortable as possible with a view to their meeting on the 18th. But if so, they must have been settled for an old song, as the Tharsis dividend is just announced of 16½ per cent. for 14 months, or 14 per cent. for the year. Now, as according to the Rio Tinto report and meeting the loss in copper alone was 6*l.* 2s. 6d. a ton for the year, and pyrites 5s. a ton, it is clear the Tharsis must have required all their money to declare the very handsome dividend, under the circumstances, just announced. If I were a shareholder I would like to ascertain at what price per ton directors valued their copper and pyrites at present on hand? I guess it is not the price of the day. A LAWYER.

CHONTALES MINING COMPANY.

SIR,—At the meeting of the company, held on May 30, it transpired that the amount of debentures taken and applied for was estimated to be about 3200*l.*, and in consequence of this sum not reaching 5000*l.*, as asked for by the directors, it was decided to wind-up the company, which would have to be confirmed at a subsequent meeting to be convened not earlier than a fortnight from date of meeting, and not to extend beyond a month. It will be to the interest of those shareholders who have not yet taken up their apportionatement of debentures to do so without delay, to avoid the company being wound-up. In a large and valuable property like the Chontales Company the debenture-holders must see, this being the first charge, that they have ample security and good rate of interest—10 per cent.—for their money. Our position appears at the present time to be this. We have a good manager (Mr. White), in whom every confidence is felt by the directors and shareholders; and about three weeks since, when at the office, I perused his monthly statements for several months past, from which it appears he has a good stock of machinery, duplicates of same, and stores; and that he has overcome the difficulties of late arising from the want of labour, through fever, with the advantage of receiving remittances of specie, and the rainy season having set in, it is obvious that he will be able to give us what we have for some time been expecting—the result of crushing 2500 tons instead of 1200 tons of

ore per month; and from the following extract from a daily paper of the 3rd inst. the difficulties of transit are likely to be overcome:—

"COMMUNICATION WITH NICARAGUA.—There is a prospect of direct communication being permanently established between the Atlantic and Lake Nicaragua. As already announced, the passage of the River San Juan has been forced by the steamer Cobourg, and the Government of the Republic of Nicaragua has engaged the services of an engineer to remove the principal obstacles to the progress of large steamers up and down the river, or to construct a canal, if necessary, by which the rapids may be avoided; at the same time railway communication between the Lake, the interior, and the Atlantic coast is being rapidly extended. It is proposed to construct a new railway between Corinto, the new port on the Atlantic, Chinandego, will be completed as early as possible, in order to test the capacity of the country to bear the extension of the line right across to the isthmus. It is anticipated that the undertaking will prove highly successful. The trade of Corinto is rapidly increasing, the exports of cocoa, sugar, cedar wood, and especially of coffee, being of considerable value."

Bristol, June 4. W. B. PALMER.

LEAD MINES IN FRANCE.

SIR,—I am sorry that my remarks should have irritated the writer in Industry, but his last statements absolutely confirm what I advanced—that there are many rich lodes in the Pyrenees, but attempts to work them in French hands have failed, partly, without question, owing to their inaccessiblity. His instance of successful mining at Pontgibaud under English management further supports my view, but he has so expressed it as to lead a reader to think the mine is in the Pyrenees instead of near Claremont, in Auvergne, as far from the Pyrenees as Newcastle is from London. Pontgibaud yields as much as 150 ozs. of silver per ton of ore. I alluded to the existence of free gold in the Pyrenees, not to that usually contained in silver.

Granted that the French are the ablest arithmeticians, engineers, philosophers, wine growers, chemists, and cooks in the world—miners they are not. The underground instincts of a Cornishman are derived from the development of certain organs in the brain through a period traceable in history for upwards of 2000 years, during which the mining population have passed one-half of their lives underground, and a good Cornish miner of average ability is worth underground the whole staff of all the Schools of Geology and Mines in England or France. You might as well expect a terrier to take naturally to pointing as to find what I may call "underground eyesight" developed in a generation. Take Sentein (Bentaillon) for instance. When purchased in September last the lode in the lowest level, No. 4, St. Eugenie, was lost owing to a slight alteration of dip, and the French engineers were driving hopelessly towards daylight the other side of the mountain without a chance of ever finding their "lost sheep." A cost of 30*l.* re-found the lode, worth from 100*l.* to 150*l.* at least per lineal fathom, and for a great length. Above ground the machinery was most elaborate and beautiful to look at, and probably was copied from the frontispiece of some professorial publication on mining, the value of which was no doubt greatly enhanced by the copper-plate engraving, but in practice it "dressed the ore to death," and lost nine-tenths of the silver.—*Pyrenees.* ARIEGE.

THE SCIENCE OF MINING.

SIR,—In treating of mining I shall regard the term Science in its ordinary acceptation—as synonomous with knowledge, and aver at the outset that a knowledge of mining in its practical and theoretical relations embraces a knowledge of several distinct sciences, in addition to the science of their proper application. What are the fundamental principles of the science of mining in the abstract—that is to say, of mining in itself; and what is apprehended and comprehended by the knowledge which constitutes it a science; and how is such knowledge best acquired? That mining is an important industry, and not only so but essential to the advancement of civilisation, of social, commercial, and scientific progress throughout the world, is now generally admitted. But is the importance of mining as a staple industry of this great Empire so regarded in the pursuit and promotion thereof? One is almost led to conclude from the methods employed in so many concerns falling within the province of one's personal observation that mining in the proper sense of the term had never been taken into consideration. If my idea of mining is a correct one there is a comprehensiveness in its outlook embracing a variety of objects and features indicative of objects revealing, or rather outlining, the seen and unseen. A recognition of the objects and features indicative of the objects presupposes a knowledge of them, their constituent parts, and usual associations; and this leads to a process of induction, and comparisons are instituted. Mentally, in most cases, it must be inferences are drawn and conclusions arrived at. It is essential to a correct conclusion that the reasoning process should not be too hastily performed, or performed from a too cursory survey of the principal objects and their associate conditions, as in such a case some important points might be overlooked and escape observation, which if they had been taken into the account would have altered the conclusion concerning the results to be expected from their development in a most material manner. It is, therefore, not only necessary that comprehensiveness of views should be observed and practised in this preliminary department of theoretical mining, but that closeness of observations of the minutest features should not be lost sight of.

The next step combines practice with theory. Comprehensiveness of outline should be included in compactness of the plan of working—that is to say, as many of the objects which indicate fecundity should be aimed at and prosecuted from the most convenient and commanding centre. The lines of divergence or convergence of the several veins known to be comprised within specific limits, whether longitudinally or in depth, should be carefully noted, and differences, if any, in the character and constituents of the several veins in their different and opposite directions, whether in converging to or diverging from each other, should not be lost sight of; but, on the contrary, regarded with interested attention. The containing rocks should also be objects of special interest, as they are, indeed, of special and paramount importance. If the origin and formation of metalliferous veins and deposits proceed from the infiltration of surrounding rocks, as they evidently do, the quality, structure, and general condition of such rocks for supplying the necessary mineral constituents—metalliferous and otherwise—cannot be disregarded without incurring the danger of arriving at misleading conclusions in respect of progressive and final issues. It sometimes, and not unfrequently, happens in the early stages of mining that but little if anything of the rock structure of the section or sett about to be operated is at all exposed or can be seen without incurring some expense in experimental explorations.

The driving of an adit, where the hilly or undulatory nature of the surface will admit of such an operation, is of great advantage, both as an exploratory and experimental projection, whether extended on the course of a lode or transverse thereto. If the line of a lode be pursued its advantages are obvious. A longitudinal section of it—to a greater or less extent—is cut out, and its entire contents noted, together with what changes have occurred, and from what causes produced. If, however, it be not convenient to extend the adit on the course of the lode, but on the contrary in a direction transverse thereto. Such a proceeding is not without its advantages, independantly of intersecting the lode itself, and providing facilities for the further and fuller development of that, and it may be a series of others—in short, it lays open and exposes to full view a greater or less section of the contiguous rocks, according to the extent of the transverse section cut through, upon the nature, quality, and structure of which the fecundity of metalliferous lodes so much depend, especially when the work is prosecuted on the upper or overlying side of the lodes, as most lodes incline to one side or the other of their perpendicular at the surface on descending. I have dwelt longer on this part of the subject than I at first intended, but not longer I think than was necessary to make intelligibly clear the views I desire to enunciate.

I have already estimated that whatever objects of interest sufficiently commanding to invite attention and stimulate expectations respecting their respective prospective values, should be embraced in the smallest radius from the most convenient and commanding centre; that is to say, the engine-shaft should be sunk so as to command the greatest number of the most prominent and promising objects with the least expense possible. The plan of working being arranged and decided on, and the objects, the development of which is intended to be prosecuted clearly defined in outline, a field of interest opens up before the responsible explorer, which scarcely anything can equal in its intensity, heightened by the vicissitudes of unforeseen and unexpected events, now elevated then depressed, the feelings of the mind rising and falling like mercury in the barometer from causes over which the individual has not the least control, "But hope springs immortal," &c., and nowhere with greater tenacity and vigour than in the breast of the well-trained and practically experienced miner; he adheres to his—to him—well founded views and conclusions, and will accept of no verdict except that arrived at by actual demontrations of all the points included in his original plan, and from which his conclusions were drawn and entertained, and hence thoroughly efficient development of mines is his object and delight, but scratching superficially in search of an unintelligible and undefined something is to him an abomination and abhorrence. His plans being well thought out and arranged there is scarcely ever a necessity to alter them, and, therefore, to prosecute with unremitting diligence the definite objects outlined until their development is effected is his one unalterable purpose and aim. But the science of mining is not at all engrossed and absorbed in its preliminary arrangements, but is co-extensive with the system itself, its progress and fullest developments, as evidenced in its mechanical, chemical, physical, and logical merits, of which the physical condition of mines is most fundamental, and on which I purpose to dilate in my next letter. ROBERT KNAPP.

Llanrwst Lead Mine, June 4.

HOME AND FOREIGN PRODUCTION OF TIN.

HOME INVESTMENTS.

SIR,—This question has occupied the thought of all interested in tin mining at home, some giving way to despondency, fearing all possibilities of higher prices have passed and gone for ever—that tin is an exception, and no rise can come again. One would ask, are such minds capable of reasoning? Do they know what experience is, or do they read and observe what has appeared in your valuable Journal from time to time? Under the heading of the Metal Market, in last Saturday's *Mining Journal*, the writer confirms the report of Mr. Kayser, the mine manager of the Mount Bischoff Tin Mining Company. The report of Mr. Kayser at the last annual meeting, held at Launceston, says:—"The wash-dirt in the face at the foot of the self-acting incline has not maintained its former character, the western portion running shallow and poor; but to the eastward the wash-dirt is 38 ft. deep not bottomed, with much improvement in quality." This deep ground almost joins the bottom face, and to all appearance forms a gutter, taking a sweep towards the hill. The wash-dirt at this place is very good, but very much cemented, and hard to break. About 48 ft. beyond the deep ground the bottom rises in terraces until it runs on to the porphyry rock close to the first dam."

"The rocky part of the face has improved; it is neither so hard to work nor so extensive; but this is counterbalanced by a large body of cemented gravel at the opposite end of the face."

An adit has been let to drive from the foot of the incline. Mr. Kayser says:—"The country passed through in this drive is of a most peculiar character, consisting of mudstone, containing numerous specimens, sulphite and carbonate of iron, fluor-spar, and tourmaline. Occasionally sandstone, slate, and dykestone are met with, but the only mineral of any value I found at the mouth of the adit was galena.

To separate the tin from its matrix it is necessary that stamps should be erected. All experienced miners know what this involves—not only cost of erection, cost of dressing, but loss of tin by the water and slime carrying it away.

The above report confirms not only the report of your correspondent but every miner capable of giving an opinion. The views of Mr. Mufford expressed in your columns seem being realised. But what are the facts of the past seven months? Let us take the shipments. We had in November and December, 1877, 1219 and 1324 tons respectively; in 1878, January 620, February 863, March 817, April 843, May 1045 tons: total, 6730 tons. In November and December, 1878, we had 387 and 1111 tons; 1879, January 727, February 866, March 700, April 670, May 328 tons: total, 4789 tons for the last seven months, as against 6730 tons for the corresponding seven months; deficiency on seven months, 1941 tons.

Tin ores sent from Launceston and Hobart Town from the Tasmanian mines for the sixteen weeks ending April 13, 1878, 2930 tons; for sixteen weeks ending April 12, 1879, 1172 tons: decrease, 1758 tons. Now let us see what quantity there is afloat, comparing the past four months of the years 1878 and 1879. The year 1878—February, 57 tons; March, 422 tons; April, 843 tons; May, 1045 tons: total, 2345 tons. The year 1879—February, 36 tons; March, 430 tons; April, 445 tons; May, 328 tons: total, 1239 tons. This shows 1106 tons less afloat at the end of May, 1879, than in May, 1878. Can evidence be more conclusive that the day of over production is well nigh spent, as all extremes do spend themselves, and that while the very low prices have caused tin to be used where it will never be supplanted, and thus brought about a cause which must run its course in due time to an opposite extreme of high prices sooner or later. Private letters received by friends living by tin mining in Australia all show that lessened production from exhausting fields, without discovery of new ones, is the inevitable. The Mount Bischoff tin seems to be found in an extraordinary conglomerate. Although a gutter and a porphyry dike exist there is no evidence of any lode or vein, or of that settled strata which all experienced miners would like as an indice of a permanent source of supply.

What is the future of our Cornish mines? The tin lodes on the north and south of the Carn Brea Hill are as clearly and definitely defined as the rivers on the surface of our earth. The richness is increasing as depth is attained. Why should not the laws of specific gravity be found in our tin lodes, and the heaviest and richest be as depth is attained? Thus it appears in the shaft and bottom level of Dolcoath, and also in the parallel lodes to the north. The question of exhaustion by finding the bottom is beyond conception; other difficulties, heat, ventilation, and hauling the ores are more likely to arise centuries hence than the question of payable quantities of metal.

Within the past few years a lode long worked in Wheal Uny, and continuing its course eastward of Carn Brea Hill until it enters the granite range of Carnmarth, passing west show the granite of South Condurrow and Wheal Grenville, and how far beyond it is impossible to say. This lode, called the Great Flat lode, is the master lode underlying south on the face of the northern granite hill until it passes below the killas basin into granite, improving in productiveness as depth is attained, as witness South Frances, from whose limited workings and powers of drawing nearly 300 tons of tin returned by 48 heads of stamps were sold during four months, giving a large dividend, and carrying forward a very handsome balance. This Great Flat lode in Wheal Basset is about to contribute still more to the wealth of the district, the employment of miners, and the profit of the shareholders.

It seems to the writer beyond question that Nature, in the evidence of her geological features, tells in the plainest manner—here is tin in abundance; nay, far more within the limits for profit than the 400,000*l.*, or 500,000*l.* given in copper dividends at a recent period. The history of North Basset seems to repeat itself—men refusing to learn by experience or act under any but the impulse of weakness. North Basset formed a portion of Basset, was sold for a song. Before a call was made the rich copper ore was cut, and your old *Mining Journal's* testify to the shares with *nil* paid marketable at 42*l.* to 44*l.* per share, or a quarter of a million for the mine. Wheal Basset exceeded in dividends and in price even North Basset. North Basset ceased working for copper in June following Overend and Gurney's failure—has again become united to Wheal Basset. A new 80-inch cylinder engine is nearly finished and ready for erection upon a perpendicular shaft, through which, with the powerful drawing machinery being erected, a very large quantity of tinstuff may and will be drawn at an early date.

Around and about the second shaft—Grace's—a number of tributers are already at work, and as the water is got out more will find employment. With two good shafts, 150 yards apart, and the Great Flat lode intersected in each, the mine is looked upon by practical men as the Dolcoath of this range. All the necessary machinery for returning a very large quantity of tin is erected, and burning-house and dressing-floors complete for sending 150 tons of tin per month to market.

Of investments it would be very difficult to point to one so promising of early success as Wheal Basset shares at the present nominal price. Nature in external evidence, and man's experience of the effect produced by so many rich copper lodes dropping as tributaries into that great and masterly Flat Lode, point to this as no speculation, but as certain of satisfactory results as the tilling of the field or the cultivation of the garden. X.

DEVON GREAT CONSOLS—HOLIDAYS QUESTION.

SIR,—I have read the long reported proceedings of the meeting of shareholders in this company in last week's Journal, and I certainly think the shareholders have much to be thankful for in having such an excellent Chairman, who can put matters in their true light before a body of shareholders. His long and varied experience and judgment in all mining matters is so well known and appreciated that I feel sure his good intentions are entirely for the welfare of the company, and as well as those employed, in the present unfortunate distress and depression now existing, not alone in Cornwall and Devonshire, but all of the country. The workpeople appealed to the shareholders regarding the holidays and wages. They have got the shareholders' answer, which is that they require the same hours or days of work as at all other leading mines in Cornwall. The general holidays in Cornwall I am told are Good Friday and Christmas Day. If a whole or half a Whit Monday is given extra work is required to make up for this. The measuring, setting, and pay days are all on one day, on Saturdays, the men working up to 12 or 1 or 2 o'clock on that day, and the men go to work again on the Monday morning at 6 or 7 o'clock. No idle time is, therefore, on any account allowed, all employed working most cheerfully. Why should Devon men object to do the same? Let us take the 14s. a week as a basis (fair wages these times, remember of cheap living, for eight hours a day of labour) or 2*l.* 16s. per month of four weeks (being 13 months of four weeks). Now, leaving out Sundays for this June setting month, what do we find regarding this Devon holiday question? Out of the 24 working days we have to deduct the time *unworked*:—

First of all there is the Whit Monday	1	day.
Midsummer Eve	½	"
Midsummer Day	1	"
Friday, leave off work at noon measuring day—or say	1	"
One whole Saturday	1	"
Three half Saturdays	1½	"
Then the so-called Maze Monday, which years ago was abolished in all well-managed mines in Cornwall	1	"
Equal to about	7	days.

So that out of the 24 working days (or *four weeks*) the company gets *not three weeks of work accomplished!* In other words, the basis of 14s. a week becomes in reality about 19s. to 20s. a week for *actual work performed*. Is this, may I ask, to be considered right or just to a company struggling on for existence, and losing, as was shown at the meeting, some 5000*l.* for last year? Ask any of the much respected mine managers, directors, or pursers throughout Cornwall or elsewhere if this state of things existed amongst them how many mines could keep afloat with present price of metals, or what they think of such continued management being allowed against the true interests of the lords of the soil and the company, and I will say the workpeople likewise? It is no wonder that shareholders whose interests cost them some 20*l.* or 30*l.*, and perhaps 40*l.* or 50*l.*, per share, which are only now quoted at as many *shillings*, and only received one small dividend since 1872, cry out now loudly for reform, and insist on it, or otherwise suspend operations. Mr. John Taylor's remarks submitted to the meeting were quite to the point when he said that "*Maze Mondays and all such abominations* should be done away with, and if the English miner will not perform a greater amount of labour for the wages which can now only be afforded he will have to seek another climate." It is not only miners working underground, but all the officials and workpeople at surface, should mutually and cordially co-operate with the company, and do all in their power to assist, as others are doing, to pull through this most serious crisis of a depression never before experienced; and, by so doing, they will not only gain the respect of their employers, but of everybody who wishes well to them and to the company.—*Plymouth, June 3.* PRO BONO PUBLICO.

COED MAWR POOL MINE.

SIR,—Sound and profitable investments are always acceptable to the capitalist, no matter what the industry or enterprise which demands his attention. It has been stated and proved again and again that of all industries mining for profitable results stands unequivocally the first of all the many industries which engage the attention of the capitalist. Lead mining has a special attraction for the mining public. It is a well-known fact that lead during the last 20 years has fluctuated much less than any other metal the country produces. Wheal Trelawney, the Mining Company of Ireland, East Darren, Van, Exmouth, Lisburne, Isle of Man, Roman Gravels, Foxdale, Minera, and Great Laxey—all lead mining companies—have paid very large dividends, some of them for many years having paid as much as 50 per cent. on the original outlay. There have been few mines brought before the public having the same promise of success as Coed Mawr Pool. After making a close examination of the position and prospects of this mine, I am enabled to offer a few remarks which may be of service to your readers. Coed Mawr Pool is not a new discovery by any means. Some years ago the very highest opinions were formed of the mine, and these in every important particular coincide with the statements of mining engineers of to-day who have recently inspected it. The history of this mine, traced for some years past, proves it to be *bona fide* in character, and one that will bear the strictest investigation.

There is nothing to keep back, as the following facts will show. In 1861, when the old company held the mine, Mr. C. B. Bennett, C.E., visited and reported fully upon it. He wrote—

"I minutely inspected the sett, which is extensive, at surface, and this, although rather flat, or I should, perhaps, more properly call it a high table land in this mountainous and well-known mineral district, bears unmistakable evidence in its geological peculiarities of its highly metalliferous properties, and undoubtedly to such an extent as to induce a practical geologist to select it as the spot to open up a good mine. * * * From the lodes being so plainly improving in past and present workings as we have approached a greater depth, and which can be seen, I am so positively convinced as to the immensely increased richness of the mine at still greater depth that I strongly and earnestly advise you by all means to purchase and erect a 50-inch cylinder steam-engine in addition to your present power, and you will then command the water to any reasonable depth, and I would almost stake my existence possess one of the best paying properties in Wales. You have, as I before stated, requested my candid opinion on the mine as a disinterested party, and I have submitted it to you in the few preceding lines."

The depth of the mine at this time was only 24 fms. from surface, and large returns for a mine of such shallow depth were being made. The water has been the great and only difficulty which prevented a full development of this property. The machinery was driven by water, and as the supply for driving the wheels was somewhat uncertain the erection of a steam-engine was recommended by Mr. Bennetts, so that the mine could be thoroughly drained. Capt. Wasley, in his report about the same time, says—

"Taking every point into consideration, the property looks very prosperous, and produces the best quality of ore of any that is shipped at the Trefew Quay. The stratification and all other appearances are of the best character, and the lodes are increasing in depth. On further development it cannot fail to make a lasting and valuable property. At the present shallow depth it is making the best returns of any mine in this district."

Sufficient funds were not forthcoming to carry out the suggestions which were made, and the old company was, therefore, voluntarily wound up after having raised ore to the value of 14,000*l.* from a depth of about 20 fathoms. The liquidation was noticed in the Journal under these remarks:—

"We observe that the Coed Mawr Pool Mining Company (Limited) is to be wound up voluntarily. The mine and materials are to be sold by the liquidator. This is a very unexpected result, the company having raised and sold ore to an

amount exceeding 14,000*l.* The disinclination of the shareholders to raise capital for the application of steam-power is the cause of this abandonment. We cannot doubt but that this valuable property will be purchased, and ample capital provided by a new company. There are six good lodes ascertained to increase in value in the descent, and if steam-power had been applied at the commencement of the operations no doubt dividends would have been long since available. This is another instance where the original shareholders have abandoned an undoubtedly valuable property from disinclination or inability to subscribe sufficient working capital. In all probability strangers will reap the benefit of the costly struggle which has closed the career of the old company."

The mine ultimately passed into the hands of the present vendors, who have worked it for several years, but no attempts have been made to develope the mine to any depth other than what has been necessary to further prove the valuable character of the ore deposits, the lowest point now being 28 fathoms from surface. Since the old company existed great progress has been made in mechanical appliances for mines, and notably amongst others is the rock-drill. The idea of draining the mine by means of a deep adit level or tunnel has been entertained for some time, and it is affirmed by mining engineers that this is the only practical solution of the water difficulty, besides at the same time opening up the mine in the most economical manner. Not only will the mine be permanently and well drained at no cost beyond the outlay for driving the level but the ore will be brought out by trams through it, so the expense of pumping water and hauling the ore will be entirely done away with. It is contemplated running this adit level by means of the rock-drill, and as soon as the company begins operations a contract will be made to complete it at a cost of about 7*l.* per fathom. I have drawn attention to the old company to show that the mine is a proved concern, and the more recent operations of the private holders confirm this by the returns which have been made. At the time of the relinquishment of this property by the former company the produce averaged almost 1 ton per fathom, and the fair inference arrived at was that if the mine was capable of yielding such good returns from these shallow workings, and the lodes so regular and defined, and improving in descent, it would be found largely productive at a lower depth. The foregoing statements are fully corroborated by the reports just issued, and by several well-known mining captains. Amongst others Capt. J. Garland (who was specially recommended by Prof. W. W. Smyth, of the Royal School of Mines, to make an independent report) says—

"At 10 fathoms in depth a north and south lode has been opened on for a considerable distance. This drivage shows lead ore in the roof more or less for the whole distance . . Behind this end a stope is now being worked, where the lode produces an average yield of 1 ton of rich lead ore per fathom. Again, in the 20 fathom level there is an open lode varying in size from 1 ft. to 3 ft. wide, averaging a produce of lead ore of 1 ton per fathom, this ground standing intact to surface. A stope over this level shows a splendid deposit of lead ore, which is in places worth 4 tons of lead ore per fathom; a fine rock broken from this point can be seen at surface, which speaks for itself, and needs no further comment."

The reports of these mining agents are of the most reassuring character, and all that is needed is ample capital to run the adit level and lay out dressing-floors to bring the mine to a successful issue. The mines are easily reached from all parts of the kingdom, so that inspection of the property can soon be made, and I would advise all parties who are taking an interest in them to go and see for themselves. Every facility will be given to inspect the property. The estimates for returns and profit have all been based on the present low price of lead. The undertaking is a thoroughly honest one, and is receiving the support of that portion of the investing public who are always ready to avail themselves of such opportunities of success as Coed Mawr Pool Mine presents. WILLIAM GABBOTT.

Drapers' Gardens, London.

[For remainder of Original Correspondence, see to-day's Journal.]

THE WILD DUCK, OR SPORTSMAN'S ARMS.

"Why, Old Tom, where in the world hast a ben all this time?" "I tell ee, Uncle Henney," says Old Tom, "I've had a purty lot of trouble and towse about one thing and another since I wor here last time, and could'nt come; and that beautiful eggy-hot ben running in my mind ever since last Christmas mitten, and I dreamed about it lots of times." "Well, never mind the eggy-hot," says Jan Temby, "we got somethen here so good as that, and we are all glad to see thee again Old Tom, for our mitten's won't like the same without thee; but surely thee has'nt been idle all this time?" "Why, no," says Old Tom, "I han't ben idle weth my head or my hands, and I say now what I said more than two years ago—that with all the swaggering and boasting about the improvements in mining, and rising tin for 18*l.* a ton, why should'nt tin be rose so cheap as copper? 'Tes all humbug and nonsense, and all the improvements arn't worth my old hat till the can stop tens of thousands of pounds worth of tin running down the Reed Rever. Put a stop to this, and I'll believe in improvements, but not till then. My plan of dry dressing is the only thing that will do it, and I told you what that plan was at one of our first mittens. Gold will swim, and so will the richest part—the cream of tin and copper swim, and it never can, and never will, be stopped from swimming away until the tin is dressed dry." "I believe," says Uncle Henney, "that thee art right, Old Tom, but what are all the big capn dressers about?" "Why it seems," says Jan Jewill, "that they're paid fine salaries for sending the cream of the tin down the Reed Rever, and to Gwithian Sands, and some of them look mighty big when making speeches at public mittens, still the tin is swimming away. They are paid every month—13 times instead of 12 in the year—and not one of them can stop the tin. Surely the adventurers must be men very easy to please, or they would stop the salary of every capn dresser that could not stop the tin, for if Carn Entral hill was all good tinstuff what would be the good of stamping it into fine slime, and in trying to get the tin out of the slime if the richest part was washed away? Now, that's exactly what our capn dressers are paid fine salaries for doing." "Dress it dry" says Old Tom, "and the bals that are now struggling hard to live will make large profits, and we need not care a pin for all the furin tin in the world; for I tell ee, comrades, all the boring machines, skip-roads, man-engines, and all other good things, will be of little use so long as the tin is washed down Reed Rever." "I wonder," says Jimmy Dowa, "which is the oldest bal in the county." "I doubt if any man can tell," says Uncle Henney, "but I think Cook's Kitchen has been working longest without stopping. East Pool, or Pool Old Bal, is one of the oldest in the county, and in old times the capns there had 2*l.* 2s. a month, and the pitman 4*l.* 4s. per month. I've often when a youngster heard old Capt. Joe Vivian, uncle to the late Capn Joe, tell about this old bal, and how one of the ends in ironstone was so hard German miners had to come over to drive it. Old Pool, or as it was then named East Pool, was last put to work about 40 years ago, under the management of the late Capt. W. Petherick, who at the time was also manager of Dolcoath and East Wheal Crofty. The mine was divided into 128 shares, and a call made of 5*l.* per share; the shares soon went up to 300*l.* a share. The late Mr. Reynolds, of Trevenson, was the purser. East Pool is still a valuable mine." "When I was a youngster," says Jan Temby, "we wor a big pare of tributers working in Dunkin's Gairn, Dolcoath. We wor generally standard, and the ore from Water Style was sampled and weighed in at Dunkin's Gairn. I've often thought of the beautiful yellow ore that used to be rose at Water Style, and wondered those lodes wor not proved going east behind, and north of the Great Count House. Well, Cousin Har, D— and I used to be up dressing—there wor no crushers in the days; it was hard work to keep the pare going, and 12 o'clock time Cousin Har and I used to run down to the Royal Oak, Kiddleywink, just below Water Style, to have a pint of ale with our pasty. Uncle Jacky and Sarah Rowe wor a quiet, honest old couple, and brewed capital beer—teetotallers may say what the mind to, but when they've got to keep 40 boys and maidens from seven in the morning till six in the evening I think they would like a pint of Royal Oak ale with a pasty as well as we did. Uncle Jacky had a beautiful little garden, and it was a treat to pick the ripe strawberries, &c.; and as to the flowers, people may run after new flowers with grand names, but give me the old-fashioned flowers. Why you could smell the scent of Uncle Jacky's clove-pinks, wallflowers, gillyflowers, and cabbage roses a half a mile. I never yet saw any new flowers to be compared to them. What I should like to know is equal to a grand old cabbage rose? In the days the sun used to shine so bright and clear, and when in Uncle Jacky's garden the air seemed filled with the hum of bees and myriads of other insects, all was cheerful and bright, everybody worked hard, and wor contented. People then never thot about short cores, or four-weeks months, but now all is changed and gloomy." "Iss," says Old Tom, "and 'twill never be better till there is an end to strikes and four-weeks months, and men work all the week, and be thankful for what they get." "Ded ee heer," says Jan Temby, "about the copper coffin found in Camborne Church?" "Many years ago," says Cousin Will, "this same coffin was disturbed during alterations in the church. It is the coffin of Sir William Pendarves, of Pendarves, who was buried in the church about 200 years ago. His monument is, or was, to be seen some years ago in the south-east corner of the church. Sir William had copper ore from one of his mines smelted, and the copper made into a coffin, which he filled with wine and made his neighbours—the miners—merry, and many years after when he died he was buried in this copper coffin." "It is a pity," says Cousin Will, "that some hundreds of our single young men and women cannot go to New Zealand. I have seen a letter written by a gentleman last March, who has been ten years in that country. He says it is very difficult to get a common labourer in Auckland to work a day of eight hours for 8s. A washer-woman gets 5s. for working from 9 A.M. to 5 P.M., with the best of diet and plenty of beer. Strong hearty girls can name their own terms. All classes of able and willing working people would be welcomed, and find ready and constant employment at Auckland, the Thames, Coromandel, &c.; and a few of our keen old tributers would make fortunes in the gold mines of the Thames, &c."—*From Cousin Jack's Unpublished M.S.*

Meetings of Public Companies.

RICHMOND CONSOLIDATED MINING COMPANY.

The ordinary general meeting of shareholders was held at the Cannon-street Hotel on Wednesday,

Mr. GEORGE HOPKINS, C.E., in the chair.

Mr. HUBERT AKERS (the secretary) read the notice convening the meeting.

The minutes of the last meeting were read and confirmed. The report and accounts were taken as read.

The CHAIRMAN said: Gentlemen, I shall at once proceed to make a few comments upon the report and accounts. You have had these accounts before you, gentlemen, rather a longer time than usual, and the accounts themselves are so very full that what with the abstracts and the smelting returns which accompany the accounts I think they give you nearly every information anyone could desire. At all events it has been the intention of the directors to make them so; and, therefore, it will not be necessary that I should detain you at any very great length in going through them. It is necessary, however, or at all events advisable, that I should supplement the accounts by a few remarks. The year just now ended has been an eventful one in the history of the Richmond Company. We have had to contend as you know with both fires, floods, internal dissensions, and external attacks; but I am happy to say the Richmond Company has survived them all, and that the year just ended has been the most successful year in the history of the company. (Cheers.) If you will kindly follow me with the accounts in their order there are a few points to which I wish to draw your attention. Taking first the capital account you will see that we have expended during the year 5879*l.* on capital account, which has been taken from the revenue. Nearly all this expenditure—that is to say, about 5000*l.* of it—has been in the purchase of an air compressor and Burleigh drills; the other items are for some small purchases which we have made during the year. The total amount which we have now taken from revenue and expended upon capital account exceeds 100,000*l.*, and when I make this statement shareholders will, of course, understand that this amount has been expended on permanent improvements, and the acquisition of additional property; that is to say, on things for which you have something in hand to represent the expenditure, because all the renewals, maintenance, and such like things are charged year by year to the revenue. This 100,000*l.* has been expended on permanent improvements, by which your property has been increased to that extent in value. (Hear, hear.) The accounts being made up to February 28 last showed at that date debentures unpaid to the extent of 25,000*l.*, but these, as you are well aware, have since been paid, so that our capital account stands in the very satisfactory position to-day of 270,000*l.*, being the amount of the fully paid up shares of the company, and nothing more. Coming now to the second point in the company's accounts—the mining profit, you will observe on the debtor side the first item, which is one of the most important—the cost of mining and hauling—is 79,928*l.*; this includes the amount which is expended in explorations and dead work. We cannot tell you exactly what amount is expended on dead work as distinguished from taking out the ore, but the labour alone amounts to 17,027*l.* This is somewhat more than last year, the increase being occasioned by the additional quantity of dead work which has been done. On this question of dead work there is, of course, a difference of opinion. Some time ago I heard it stated openly that we ought to have spent a much larger amount upon dead work. Well, the object of the directors is always to do as much dead work as is sufficient to keep the mine properly explored ahead of the workings, and I think you will agree with me that we have not been niggardly in the amount of explorations done in the last year when I tell you that the total amount of drifts and winzes done during the year is a little over two miles in length. (Cheers.) The next item—the smelting—I have very little or nothing to say about, the expenses last year per ton being as near as possible what they were last year. We expect now the furnaces have been re-erected that our smelting expenses will be reduced, but of course, as you are aware, these amounts are based principally upon the returns from the old furnaces, and up to that time the new furnaces entered but very little into the question of the reduction of expenditure. The ore purchased during the last year amounted to 21,092*l.*, and here I wish to make a remark in consequence of observations which I have heard; I am sorry to take up your time by mentioning these observations, but I think it is only right that as we hear of these rumours I should take the opportunity of explaining them to the shareholders, so that they may have the fullest information before them. I have heard it stated openly that, our own Richmond ore being of so low a grade, we have been trying to make up the deficiency by purchasing ore of a very high quality. Now, I have had the figures taken out for the information of the shareholders, and printed in the report, and the result is this—that the Richmond ore during the whole year had an average value of 876·84 per ton, and the ore purchased had an average value of 859·38 per ton. So you see the statement is incorrect that we have endeavoured to supplement our ore of low grade by buying very rich outside ore. The object of our buying these ores is of course, as you know, that it is an advantage to purchase them, as they furnish a flux, and mix well with our own ores, thereby helping the smelting, and that is the only object we have in purchasing the ores, and we purchase them economically, and, so far from their being of a higher grade than our own ores, the fact is that they are of much lower grade.

A SHAREHOLDER: I suppose we get a profit upon them?

The CHAIRMAN: Certainly, a large profit. (Cheers.) On the credit side of the account you will see, and I am not going to weary you with the figures, because it is quite unnecessary, but I would just remark as I pass along that the actual amount received during the year on sales of gold, silver, and lead amounts to no less a sum than 523,032*l.* I want the shareholders to realise some of these figures, because the amounts are enormous, and the study of those figures will convey a better idea of the extent and magnitude of your property than anything else. (Hear, hear.) The marketing expenses, which are of a very complicated nature, but a careful study of abstract E, which refers to them, will, I think, clear up the items, and make them quite intelligible to you) have been during the year 136,750*l.*, the general result being that the company has realised on the gross Eureka standard assay, which is what we work upon in all our calculations, 69¼ per cent. of that assay value, and that, as compared with the previous year, is an improvement of about 3 per cent., the net returns in the previous year being 66½ per cent. That improvement, as mentioned in the report, is greatly attributable to the refinery. (Hear, hear.) We have estimates sent over from Mr. Morrison, as mentioned in the report, showing that the profits on the refinery last year were 24,000*l.*; his estimate is certainly confirmed by these figures, and you will bear in mind that this profit has been made on a falling market. Lead has fallen exceedingly low, and silver has also been low, and I think you will consider it most satisfactory that, in that state of the market, we should have been able to realise 3 per cent. more of the standard assay value than we did last year. (Hear, hear.) You will notice that under the head of total gross returns the quantity of lead which we had in hand on Feb. 28; I will call your attention to this simply to show you that we had at that date less than 2000 tons, which is brought into our balance-sheet at the value of 21,349*l.*, and 10,000*l.* of that is actual money which we have paid on freights and shipments in advance. Some shareholders have an idea that a large amount of our assets is locked up in lead which is unsaleable, whereas that is not the fact. That 10,000 tons only represent two months' produce, and out of the 20,000*l.*, 10,000*l.* actually represents money which we have paid on freights paid in advance. Well, gentlemen, the net results of the mining operations for the year is, as you see, a profit of 130,989*l.* 17s. 10d. I need not say that had lead and silver been at anything like the price which they used to be, that profit would have been very much more. Of course that is very obvious. I am reminded that that result has been obtained from eight months' smelting, because the furnaces having been adjusted at the time they were closed, previous to their destruction, about four months out of the 12 they were shut down. Going to No. 3, the revenue account, there is one item on the creditor side which to me is very satisfactory—namely, the interest received from Mr. Daniel Meyer, which amounted during the year to 4084*l.* Of course to be enabled to receive that amount Mr. Meyers must have had in his hands, as was the fact, a large sum of money at the date of making up the accounts. On February 28 the accounts stood a little the other way, but that is in consequence of the fact that just previous to the 28th of February we paid a dividend of 27,000*l.*, which, of course, had the effect of reducing the amount of the balance in his hands. I have by me an account prepared by the secretary showing the balances at the end of each month, but I need not weary you with it, because it is obvious that unless he had a considerable amount of money in his hands we should not have received that interest. The early shareholders will remember that we had to pay 3000*l.* or 4000*l.* a year to Mr. Meyer for interest, and there used to be loud complaints at, the high rate of interest we paid. It was a circumstance over which we had no control, because 1 per cent. per month is the common rate at San Francisco, and it is only an act of justice to Mr. Meyer to mention that, whilst he charges us 1 per cent. per month for balances, he also allows us 1 per cent. per month when the balance is in our favour. On the debtor side of the revenue account there it an item which I am happy to say will not appear again—namely, the interest on debentures (2606*l.*) And while I am on that point I may as well refer to the question of the debentures, because some shareholders have questioned the policy of our paying off those debentures. Well, now, the fact is, as many of you will remember, the debentures were borrowed for fixed terms—some for two years, and others for three years, so really we had no choice in the matter. The debentures became due at a fixed time, and we paid them off at that time.

A SHAREHOLDER: The best thing you could do. (Hear, hear.)

The CHAIRMAN: I think so, Sir. If any shareholder thinks we should issue more debentures if you like to pass a resolution we will act upon it; but we prefer seeing the company free from debt. (Cheers.) The dividends paid I will not refer to at any great length. Of course, they are very satisfactory, seeing that no less than 155,250*l.* was distributed in dividends during last year. I will just make one or two remarks on rumours I was going to say, but not exactly rumours, but conversations in my official capacity I have had with different shareholders. Of course, in a large constituency like ours, where we have 800 shareholders, there will be a diversity of opinion. Some shareholders say, "What a pity you paid that 1*l.* dividend in July." Well, I do not think it is a pity at all, for this reason—the shareholders are a shifting body, and I say the shareholders at that date, when the money was earned, were entitled to the dividend—(hear, hear)—and what earthly good would have been gained by keeping (say) 50,000*l.* in hand last year simply for the pleasure of dividing it now? (Hear. hear.) So far as the shareholders are concerned, who keep their holdings from year to year, it simply amounts to this, that we paid 50,000*l.* last July, whereas if we had kept it to divide it now they would have had to wait nine months for it. The money was there, and the shareholders were entitled to it; and I, for one, do not regret dividing it at that time. As Mr. Vallance reminds me, we were quite competent to pay it It did not keep us from paying all our debts, for we were enabled to do both—to pay our debts and to pay our dividend too. (Cheers.) I may say this in passing that personally I have always been in favour of creating a reserve fund—a handsome reserve fund, and I would very willingly last year have set aside 50,000*l.* as a reserve provided you had given the shareholders something to represent it. (Cheers.) I was quite willing, and I think I advocated it, to give one new share for three. I never really heard a sound objection to the principle. I quite approve of making reserves for the future, but I object to making reserves for the future when it comes out of the pockets of the present shareholders, and if you want working capital I say the right thing to do is to raise the working capital, and not keep the dividends of the shareholders, who have stood the brunt of this thing so long, when you get a profit; but to set aside 50,000*l.* of this for future shareholders, that is a policy I will not advocate. At the same time I am a great advocate for having a reserve fund under a fair condition. (Hear, hear.) Now, a little lower down in the same account there are a number of items—the loss occasioned by fire, law cost, and other items, which are mentioned in detail, and will make up 28,847*l.*, which we may expect will never appear again in any future accounts. That sum of 23,847*l.* of course represents a dividend in itself, and when you bear in mind that we have paid off, in addition to that, 38,000*l.*, which again represents another handsome dividend, I am quite sure that most of you will not be surprised that we cannot, for I put it plainly, at this moment pay another dividend. I think and I hope you will endorse the policy of the directors, and that policy was to pay their debts. They had charged all the expenses of the fire, all the law expenses, and all these extra expenses at once to revenue account, getting rid of the charges for once and for all. We do not like a suspense account. There was fire, law (a laugh), charcoal—

Mr. VALLANCE: Say American law.—The CHAIRMAN: American law. (A laugh.) We took all that at once out of revenue, and I hope and expect we shall never have to take a similar amount out again. (Cheers.) But, gentlemen, let me tell you this—notwithstanding these extraordinary expenses, amounting, I think, to more than 60,000*l.*, we should still have been able to go on paying dividends but for the very heavy fall which has taken place in the price of lead, and for the fact that our ore was of a lower grade than it was last year. As regards lead, such of you as have turned your careful attention to it will see at once how important an element it is in our profits. A cent per pound on lead represents a profit to us of 4000*l.* per month. We make about 1000 tons of lead every month, and every cent per pound makes a difference to us of 4*l.* per ton. Now, since Mr. Probert went out lead has fallen about 1¼ cent per lb., which represents a loss to us of no less than 5000*l.* per month, and that is 15,000*l.* on the three months, which is very important.

Mr. B. BROUGHTON (deputy-Chairman): Not a loss, but a loss of profit.

The CHAIRMAN: Of course I mean that—a loss of profit of 5000*l.* per month. It is satisfactory to me to be able to state that the lead market seems to have seen its worst. A short time ago, at New York (our principal market), lead was as low as 2¾ cents per pound; it just touched that, but it is now 3½ cents, which is a rise of nearly half a cent, and that, as I explained to you just now, will make a very large increase in our profits. Silver, I am happy to say, as you will have noticed, for some time past has been steadily on the increase, and I think it is now about 52½d. per ounce, and I hope it will at least remain where it is. If it does, and lead increases a little (which I think it will), we shall again make very large profits. (Cheers.) As regards the grade of the ores, you will notice in the sheet which shows the abstract of the smelting, in the last column but one, under the head of "Yield per ton of ore smelted," that in March last our ore produced $84 per ton, in April it reached $87, which was the highest point we ever reached; from that time you will see that it gradually fell from $87 down to $72, $65, $66, and $64, at which it stood when the furnaces were shut down in August last. When we commenced smelting in December the ore yielded only $55 per ton, and then fell to $51, and in February it fell to $50, but from that time I am happy to be able to state that it has been gradually increasing until it reached $64, which is the figure at which it left off in August.

A SHAREHOLDER: I think it is $57½ at the last return.

The CHAIRMAN: Well, I thought it was higher than that. Yes, in May it reached $65 in the first week, $67 in the second week, $64 in the third week, and $59 in the last week; and, as the honourable shareholder remarks, $57 last week. However, speaking generally, it has increased up to $60 per ton, and with that, and as we hope an increase in the price, we expect to make very handsome profits. Now, gentlemen, I think I need not dwell any further on the accounts themselves. As regards the mine, which is the source of all the profits, you will have followed the weekly reports which we publish showing the developments; but perhaps you will not have followed them quite so closely as we ourselves have done. It is very important for this company that a connection in ore has been proved between No. 11 chamber and No. 7. The No. 11 chamber is situated on the 5th level, and the No. 7 chamber is situated some distance back from it on the 4th level above. Both Nos. 7 and 11 are very important chambers of ore, and we have by explorations proved that the ore between those two beds is continuous and is connected—to what extent we do not know yet. The ore in No. 12, which is a large body, lies contiguous to No. 11, and is going downwards, and we are at the present time following it in its downward course. The ore in No. 10, which is a detached body, and lies nearer the main shaft, has enlarged and opened up very much during the last few weeks, and we have very good reason to expect that the ore in No. 10 will also be connected with the ore in No. 12. We are not so certain, but we have great expectations that it will do so. Again, the ore on the 4th level, as we knew some weeks ago, is making upwards, either towards the Tip-top Mine or the old Richmond; but this we are sure of, that there is a large tract of ground lying between chambers 11 and 7, and the ore on the 4th level, which, so far as human expectation may be at all certain, shows there is a very large quantity of ground there, which we may expect to be very productive, and it is in that direction that our explorations will be made, and we hope, and we have every reason for hoping, that the ore there will be a better quality than where it is just now. (Cheers.) Now having said that much about the developments, I must shortly refer to the report made by Capt. Tonkin in December last. The circumstances under which Capt. Tonkin was sent out will be fresh in the memories of the shareholders, and the directors hoped that Capt. Tonkin would have brought back something which would have been of some value to the directors, and have given them some aid in working the mine. As regards the report itself, I do not want to say anything hard of anyone. We know upon whose suggestion Capt. Tonkin was sent out, and that of itself would, perhaps, account for a good deal of what is in his report. It is very voluminous, and embraces a great many pages of foolscap. A great deal of it is taken up with a description of the mine, and the situations of the various levels and chambers. That no doubt was all very instructive to a stranger, but with that we who have studied the mine several years were perfectly well acquainted before hand. Capt. Tonkin says the drifts which our manager started from the shaft at intervals of 100 ft. apart would have been better if they had run 60 ft. apart. Well, I do not know, perhaps it would; but they are run at 100 ft. apart, and we cannot alter it. Then he says it is a pity that the main shaft was not sunk in three compartments instead of two, because when you strike water you will want an additional compartment to pump the water up from. Well, admitting it, all I can say is that the main shaft was sunk in 1872, and up to 1879 the contingency of pumping water has not arrived; and, therefore, I very much question whether it would have been policy to go to an expense in 1872 of a large outlay of money merely to sink a shaft to meet a contingency which has not arrived in 1879, and for all we know may never arise. (Hear, hear; and laughter.) But there is the fact that the position of the shaft the dimensions of it, and its capacity for doing work were settled by the then manager, aided by Mr. Clarence King, and perhaps there is no more able man on the whole Pacific Coast or in America than Mr. Clarence King; and if he made an error of judgement in 1872 as regards the shaft, all I can say in 1879 is I am sorry for it; at all events the shaft has answered our purpose, and we are content not to have spent more money upon it than we have done. (Cheers.) Then, Capt. Tonkin complains of the hoisting apparatus at the top of the shaft, which does not square with his opinion of what hoisting apparatus ought to be. Now, before ordering that we sent to the Comstock Mine, with orders to examine the hoisting apparatus, and we were rather surprised at what Capt. Tonkin said about the hoisting apparatus, as we thought we had got the best thing possible; at all events we have got the best thing on the Pacific Coast; and, so far as I can judge, far superior to anything in England. (Cheers.) Therefore we do not regret very much what has been done in that direction. As I said, he deals with a number of things which he thinks would be better if done otherwise. Well, I say—perhaps so, but that is not what we wanted him to go out for. (Hear, hear.) We wanted him to tell us, if it laid in his power, how we could work the mine more economically, so as to make larger profits for the shareholders. (Cheers.) That is what we wanted him to do. He says, "You should do more work by contract." Well, admit it; but I say you ignore the fact that we are doing all we can by contract. We let our drifts by contract. We cannot do everything by contract; but our answer is, that all we can do by contract we do. (Hear, hear.) We cannot stope our ore by contract, for this reason—that the ore requires assorting in the mine. We have very rich ores and very poor ores, and if you let a contract for stoping to a body of miners to take out the ore by the ton they will get out good and bad together, and make as much as they can without reference to our wants as regards the quality of the ore. All I can say on that point is that we agree with him in his recommendation that, so far as it is advisable, we should do as much work as we can by contract. We cannot say more. Then with regard to the plans. He says we have no plans or sections. That is a complete fallacy. We have plans and sections—more plans, I admit, than sections. We have plans sent over here from month to month showing the working of the mine, and what has been done during the month; and, above all that, we have at the office, where it is open to the inspection of any shareholder, and which is better than any plan or section, a model of the mine, which embodies all the information which can possibly be conveyed by both plans and sections combined. Of course, as I have already said, we do not want information of that sort. A great deal that Capt. Tonkin wrote to us he could not have known of his own knowledge, it was only second-hand information got from Mr. Rickard, and which we ourselves knew just as well as he did. We should have liked some practical suggestions as to improvements in working the mine. All I can say is that the directors regret that these suggestions are conspicuous by their absence. (Hear, hear, and laughter.) Capt. Tonkin ventures on very delicate ground in estimating what our reserves are, and I think, as you will see from the report, and from the circular which the directors issued some time ago, that we certainly place very much more confidence in our own manager, Mr. Rickard, who knows the mine thoroughly and has been there for some years, than Capt. Tonkin—I do not say anything disrespectful to him—who spent two

or three months at the mine and had everything to learn, or in anything which he said on the subject He estimates the reserves at an absurdly low figure. All I can say, and the best answer to that is, that we have long since smelted the quantity supposed to be there by Capt. Tonkin, and that Mr. Rickard writes every week that the chambers look the "same as usual." These are his words. Of course the report contains a good deal of what we heard last year, and, therefore, to that extent I think his report was the enlarging a good deal upon the bad policy of working out all the reserves, and that we ought to keep large reserves of ore in the mine. Well, you know very well, gentlemen, what was said about that last year—namely, that we should keep three years' reserves in sight. That is undoubtedly a perfect farce. We never had three years' reserves in sight, and probably never shall. We are well content if we have one year's reserves in sight. We wish to keep as much as we can ahead, but if you have only one year's ore in sight you may rely upon it that so long as we hold the position we do, instead of sitting down to contemplate it we shall set to work to turn it into profit. (Laughter and cheers.) Now, before I leave Captain Tonkin's report it is only right that I should say that we had one or two letters from shareholders—one, I think, only from Mr. Pailbrook (a laugh)—requesting us and enquiring why it was that we did not print Captain Tonkin's report. Well, we did not publish it for this reason—it contained a good deal you all knew about, for you had heard it before, *usque ad nauseum*, and we did not think you would care to hear it again. (Hear, hear.) Mr. Pailbrook seemed to have a notion that the shareholders are entitled to every report which comes over; we, taking a rather different view of it, thought it would be just as well not to publish it. (Laughter, and "hear, hear.") We took the responsibility of acting upon our own views of the matter, and I hope, gentlemen, you will agree with us that that was the right thing to do. (Cheers.) I will only say this, that before Mr. Probert left we said that perhaps the question of publishing Captain Tonkin's report may have to be considered hereafter, and certainly, if the report is to be published, it should only be published with Mr. Probert's comments upon it. (Hear, hear.) I will just read you one short extract from Mr. Probert's notes upon it, which will give you a very general idea of what his views were. It is under the head of "Mine machinery." "It might have been worth while to answer some of Captain Tonkin's strictures on the mode of hoisting ore had he been at all acquainted with the system of exploration adopted on the Pacific Coast, but in condemning the Richmond system he in reality condemns the Comstock system, which is identical with it in every respect. Our hoisting works and everything which is connected with them, as well below as above the surface, are models after the best Comstock patterns; our system of timbering is the same; our mode of stoping, tramming, and hoisting is the same; our mining foremen and miners are drawn from the Comstock Mine, where everything has been brought to the highest pitch of perfection for the advancing of the mining industry of the country, and with continual reference to the local mining conditions prevailing. If Capt. Tonkin were as familiar with the practices in vogue on the Pacific Coast as he possibly is with those in older countries, possibly he would not have fallen into so many mistakes." I think that contains a fair comment upon the whole. Capt Tonkin may be a good man to advise upon mines in this country, or at the Cape, but send a man to a new district where everything is to be learned, the result is he falls into errors and mistakes, and thereby renders his report of no real value to us. (Hear, hear.) Now, I know many gentlemen are anxious to hear something about the lawsuit. It is always disagreeable to have a lawsuit hanging over us, because it gives persons who are so disposed an opportunity of making remarks upon it. The simple facts are these—that we had, as you know, an action of ejectment brought against us some time ago, in which our opponents succeeded. We have appealed to the Supreme Court at Washington against their decision, and in due course, whenever that may be, it will come on for hearing. I was told the other day, for my information, that the appeal had been heard and dismissed; "Well," I said, "I have never heard anything about it, and I do not think it can be true." (A laugh.) The fact, is there is no truth in it. The appeal has never been heard. Perhaps what gave rise to the rumour some time ago was this. We thought it was very unfair during the pending of the appeal that one of the parties to the dispute should be allowed to go on taking out ore from the disputed ground. I think you will agree with me that it was a very reasonable assumption that, pending the hearing of the case, it was only fair that both parties should be restrained from removing the ore. Well, the fact is this. Having succeeded in the injunction the Eureka Mining Company have been busily employed in taking out the ore as hard as they could from the disputed ground, and, therefore, our injunction to restrain them from doing so matters little or not whether we get it, because during the law's delay they have stepped in and worked out the ore, so that the injunction now is of no value so far as regards the lawsuit. I am happy to be able to inform the shareholders that within the past few months the Legislature of Nevada have passed an Alien Act, which will have the effect of enabling us to put ourselves in a very much more satisfactory position as regards our property— (hear, hear)—and under the advice of our solicitor we propose at a very early date to take such steps as will strengthen our position out there. (Cheers.) Now, gentlemen, I think I have nearly said all I have to say. With regard to the paragraph in the report referring to the fire at Eureka, that is almost become a matter of history. You all know the circumstances as well as I do. It was a very lamentable affair, and the town suffered very much by it. Immediately on hearing the news we telegraphed out to Mr. Probert that we sympathised very much with the town, and we authorised him to make a subscription towards the pressing wants of those who were rendered homeless. Well, Mr. Probert had already anticipated our wishes, and had subscribed $1000 in behalf of the Richmond Company. I myself should have been prepared to give them a larger sum, but he, being on the spot, could judge better than we could. At all events we were perfectly satisfied with the action he had taken in that respect. As regards the directors, as stated here, since our last meeting the board has filled up the vacancies by the election of Mr. Bower, Capt. Stewart, and Mr. Wilson. I will only say of those gentlemen that we are very glad of their assistance. Mr. Bower we know of old, and Mr. Wilson and Capt. Stewart are of very great assistance to us. They both bring to the affairs of this company a great deal of practical knowledge and good sound sense. I hope the selection we have made to fill up these vacancies will meet with your approbation. With these remarks I beg to move the reception and adoption of the report and accounts.

Mr. B. BROUGHTON, deputy-Chairman, seconded the resolution.

Mr. J. ELLIOTT, referring to the question of debentures, said he had a notion upon the subject. At the time the debentures were issued the company were in such a critical position that those debentures rendered inestimable service. The Chairman had stated his opinion that, if a working capital was required it should be obtained rather from the direct sum raised for that purpose than by retaining the ordinary profits, which should be distributed in dividends. Well, that was a question which was open to discussion; but at any rate he thought they should not be left without a reserve in this company, unless they had some debenture fund or funds in hand such as he referred to. For what was their position? It was true they had made satisfactory profits—the most satisfactory of any year since the commencement of the company, and profits realised from the result of the forethought which obtained all this additional ground for the company. But they had distributed in dividends the whole of those profits, and, therefore, it became necessary to make a large quantity of lead on a falling market. They had paid for that very dearly, but if they had had some funds in hand they could have held on until there was a rise in the lead market. Therefore the question was whether they should adopt the direct suggestion of the Chairman, and raise a fund specially as capital by the issue of new shares or some other mode which might be thought desirable? Now his own opinion was that debentures formed the simplest mode of doing it. At any rate he thought it was essential they should have 30,000*l.* or 40,000*l.* at least. He knew the company was very strong, but they stood financially very weak unless they had some kind of reserve. (Hear, hear.)

Mr. BOLTON said he most decidedly opposed the suggestion that there should be any more debentures. (Hear, hear.) Anyone who had watched events in this city during the last few years must have been struck by the immense number of companies wound up in consequence of debentures—(hear, hear)—and therefore he was greatly relieved when he saw the directors had made use of their undivided profits for the purpose of extinguishing the debenture debt, and he trusted they would never be induced, except under exceptional circumstances, which he did not wish to contemplate, to issue any further debentures. (Cheers.) There was no necessity for that with profits so large as they were making, if it could possibly be avoided, and if necessary they could be satisfied with a much more moderate dividend, and have a large reserve created by a portion of those profits being capitalised. He approved of the suggestion of the Chairman that they should divide a portion of the profits, and that the remainder be capitalised, and given to the shareholders in the proportion of one share for four or five, and he hoped that course would be adopted by a future meeting. As a man of figures he would show them what the profits of last year were, apart from the undivided profits of the previous year. Upon the capital of 270,000*l.* they had made 146,630*l.*, of which they divided 81,000*l.* in dividends, they spent 49,360*l.* upon special matters, and they now carried forward 16,230*l.* to next year. He thought these figures exceedingly satisfactory. (Cheers.) He hoped the directors would have no difficulty in keeping up handsome dividends in future, and at the same time keep a balance in hand which they would be able to deal with in the admirable manner sketched by the Chairman.

Mr. DEARLE pointed out that if to form a reserve fund the shareholders took shares they not only received 1*l.*, but also it represented a handsome premium, and any needy shareholder would have nothing to do but to go into the market and sell his shares. He thought it was a mistake not to adopt the plan suggested by the Chairman.

The CHAIRMAN said, in answer to a SHAREHOLDER who had not quite caught the explanation regarding the lawsuit, the appeal was against the action of ejectment; but the point to which he had more particularly referred was the application to the Court that, pending the appeal, it was of importance that both parties should be restrained from taking out the ore from the disputed ground. As regarded the remarks of Mr. Elliott, at the time the debentures were issued it was very important that they should be raised; but he thought that Mr. Elliott was at one with the directors in saying that the board did the best thing they could in paying those debentures off, more particularly as it had been paid out of income, and he hoped and expected at no distant date to be able to create a very handsome reserve, although, as he had before explained, he was not altogether of opinion that they ought, at the expense of the present shareholders, to create a very heavy reserve for the benefit of the future shareholders. (Hear, hear).

The resolution for the adoption of the report and accounts was then put and carried unanimously.

Mr. B. BROUGHTON moved the re-election of Mr. George Hopkins as a director. He said that Mr. Hopkins was well known for his high honour, ability, integrity, and honesty, and the zeal which he had always manifested in the interests of the company entitled him to the fullest confidence of the shareholders.

A SHAREHOLDER seconded the resolution, which was put and carried.

The CHAIRMAN acknowledged the compliment, and then proposed the re-election of Mr. Schultz as a director, remarking that that gentleman had done good service to the company.

The Hon. Mr. STEWART seconded the resolution, which was put and carried.

On the motion of Mr. ELLIOTT, the auditors, Mr. George Broom (Messrs. Broom, Son, and Hays), and Mr. James Fraser, were re-elected.

A cordial vote of thanks was then passed to the Chairman and directors.

The CHAIRMAN, in acknowledging the compliment, said the directors would do the best they could in the interests of the company. There were times when the duties were very arduous, but they had all great hopes, and he believed the Richmond property was one which would produce very great profits, and the directors on this side would do all they could to contribute towards that very desirable result. There was one remark which he would make, and he did it rather apologetically. In times of depression in the affairs of the company he was inundated with letters (they had now 800 or 900 shareholders), asking for advice, and sometimes it happened he was not able to reply to the shareholders so promptly as he could wish. Therefore, if there were any gentlemen present who had written and not received a reply he hoped they would accept his apology, as they would perceive the delay was not intentional. (Cheers.)

The meeting then broke up.

RUBY CONSOLIDATED MINING COMPANY.

An extraordinary general meeting of members was held at the offices of the company, Crosby-square, on Tuesday (Mr. W. A. MALCOLM in the chair), for the purpose of passing the following resolutions:—

1.—To wind up the company voluntarily.

2.—To appoint liquidators, and to fix the remuneration to be paid to them.

3.—To authorise the liquidators, under the 161st section of the Company's Act, 1862, or otherwise to take all the necessary steps for the purpose of carrying into effect the scheme of liquidation and reconstruction agreed upon in the agreement dated Feb. 4, 1878, and made between Hermann Heynemann, of the first part, Leonard David Heynemann, of the second part, Edward Herzberg Hartmont of the third part, and the company of the fourth part (or such modification thereof as the liquidators may approve), and for that purpose to sell the business, goodwill, property, rights, assets and effects of this company to the intended new company mentioned in that agreement, when established, in consideration of the allotment of shares in the capital of such new company, and otherwise in accordance with the terms of the same agreement, and to authorise the liquidators to enter into any preliminary or other arrangements or agreements with any person or persons acting on behalf of the intended new company or otherwise for the purposes aforesaid.

The SECRETARY read the notice calling the meeting, and the minutes of last meeting were read and confirmed.

The CHAIRMAN said that before moving the resolutions he would advert to the position of the company on Dec. 23 last. At that time he informed them that the agreement which the company had arrived at between Mr. Heynemann and Mr. Hartmont had then been carried out to a certain extent by Messrs. Heynemann, but the company's agents in San Francisco were not able to agree with Mr. Hermann Heynemann as to the extent of the property and the rights which he had to convey back to the company. After many mishaps the principle of arbitration was resorted to. Unfortunately the arbitrator originally appointed was unable to act, and the arbitrator next appointed died, and the third arbitrator, who accepted the office was prevented by illness from beginning his task for some time, and then it took many weeks to hear the evidence on both sides and fight it out to the end before it was closed, and the arbitrator had everything before him on which to found his judgment. This caused great delay, which was much to be deplored, but ultimately the arbitrator gave his award in March, and it secured to this company all that they could reasonably hope and expect. That award would be adhered to by this company, and it ended by Messrs. Heynemann giving up possession of the properties of the company in America. The resolutions which had to be passed, and which had been read by the secretary, were the resolutions which had to be passed in accordance with the agreement which was made by the company with Messrs. Heynemann with a view to the entire reconstruction of the company; in fact the resolutions were simply those which had been adopted by the shareholders when they sanctioned the agreement with Messrs. Heynemann and Hartmont in February, 1878. He would propose the resolutions separately, and would first propose that the company should be wound up voluntarily.

Major-General D'OYLY seconded the resolution, which was put and carried without any discussion.

The CHAIRMAN moved the second resolution—To appoint liquidators, and to fix the remuneration to be paid to them. In the circular which had been issued it was suggested that the present directors of the company should act as liquidators of the company. The duties would be almost nominal to those acquainted with the company, but heavy to outside persons, and they wished to avoid the expense of professional assistance. The directors had consented to act, and they did it in the interests of the shareholders, and to carry out the liquidation in the simplest and easiest manner possible, with the assistance of the company's legal advisers.

Major General D'OYLY seconded the resolution, which was put and carried.

The CHAIRMAN then proposed the third resolution, which is given above. He said that proposition simply carried out in exact terms the form of the agreement of December, 1878.

A SHAREHOLDER: Will the shares all be of the same value in the new company?—The CHAIRMAN: Yes; 10*l.* It was so mentioned in the agreement of Feb. 4.

A SHAREHOLDER: Has the number of shares been reduced?—The CHAIRMAN said that by the agreement the number of shares had been considerably reduced. The original capital was 325,000*l.*, whilst in future the capital would be 253,000*l.*

The SHAREHOLDER: You are going to give new shares for the old?—The CHAIRMAN: Yes.

Major-Gen. D'OYLY seconded the resolution, which was put, and carried.

Mr. ARMSTRONG moved—"That the present directors, in consideration of the valuable services given by them in the past as directors and to be given in future as liquidators, be requested to accept payment in the sum of 5000*l.* in second debenture bonds of the company, redeemable in six years, in such proportions as the directors may apportion amongst themselves, and that the directors be authorised to take such steps as will enable them to carry out the resolution, it being understood that in the event of preference shares being issued in the new company the directors will exchange their bonds for preference shares."—Mr. LANE seconded the resolution, which was put, and carried.

Major-Gen. D'OYLY returned thanks on behalf of the board as the oldest director on the board. He pointed out that if the company turned out a success the directors would be remunerated, but if it did not turn out a success they would have worked for nothing.

Mr. HAYES asked whether it was the conviction of the directors that the prospects of the new company were favourable.—The CHAIRMAN said he would make a few remarks on that point. When the directors issued the notice for this meeting they were in receipt of telegraphic information which, as far as they could ascertain, conveyed the intelligence that the mine was entirely in the possession of the company. They had that day received a written communication from San Francisco fully confirming that the company were in possession of the mine. Sufficient time had not elapsed for the agent to obtain a detailed report on the mine, but no doubt such a report would shortly be sent over as to the value of the property, which of course would be submitted to the shareholders; and he (the Chairman) then read sundry letters in confirmation of the telegrams. On the 29th of last month the directors had received the following telegram, which showed that Mr. Rickard had made a report:—"Rickard reports Duneburg exceedingly valuable, surpassing expectation; in good order; funds necessary." It was intended to have another report from another good and reliable person in addition to Mr. Rickard.

A SHAREHOLDER suggested that Mr. Price should be engaged for that purpose.

The CHAIRMAN said the directors could have no objection to that gentleman. The next question was one of finance, which must be carefully considered. After five years struggling they had now got possession of the mine, and if they did not prosecute it vigorously they might as well not have fought for it. Since the directors had got the mine in the possession of the company they had taken steps to ascertain what was the best way of raising working capital. Mr. Probert was of opinion that the Atlas and Duneberg could be worked for 10,000*l.*, and therefore the directors considered that if 12,000*l.* were raised it would be sufficient to form the nucleus of a working capital, and also pay off about 2000*l.* of liabilities which existed, and some of which might possibly be paid off in debentures. At the present time the directors had not obtained any definite proposition with regard to the working capital, and they would be glad to receive suggestions from the shareholders. The ordinary form was to issue debentures, but although one or two gentlemen had offered to take a considerable amount no definite arrangement had been come to.

A SHAREHOLDER suggested preference shares, with the option of exchanging them for ordinary shares.

A conversation ensued, after which the CHAIRMAN said that between this and the confirmation meeting the directors would take into consideration the best mode of raising the capital, and would be happy to receive suggestions from any of the shareholders in the meantime.

Cordial votes of thanks were then passed to the Chairman and directors, and to Messrs. Falkner, Bell, and Co., and Mr. Bernard, and the meeting broke up.

[For remainder of Meetings, see to-day's Journal.]

ALBANIA AND THE ALBANIANS.—An interesting little pamphlet by Wassa Effendi—The Truth on Albania and the Albanians, Historical and Critical—carefully translated by Mr. Edward St. John Fairman, has just been issued through the National Press Agency, Shoe-lane. Mr. Fairman refers to the patriotic intention of Wassa Effendi in writing the pamphlet, and to his natural desire that his native land should be recognised to be, as he clearly proves, the most ancient nation of the Levant, and he suggests that it should be visited, studied, and more fully and generally described by scientific men and tourists, who will corroborate Mr. Wassa's assertions as to the undeveloped sources of wealth which it contains in its virgin forests, unworked mines, its unutilised watercourses, and its primitive mode of agriculture. Albania has always been an almost unknown country to the western nations, but it may be hoped that the present memoir may assist in directing attention to it.

SOCIETY OF ENGINEERS.—The Transactions of this Society for 1878, which has just been issued, forms a handsome volume of nearly 200 pages, and is illustrated by a large number of beautifully executed plates. In addition to the inaugural address of the president there are the papers and resulting discussions on water purification, sanitary and industrial, by J. Walter Pearse; on equalising the wear in horizontal steam cylinders, by W. Schönheyder; on *modern roadway construction, by Henry S. Copland; on the lighting and extinction of street gas lamps by electricity, by St. George Lane Fox; on the vacation visits; on the *application of electricity to the ignition of blasting charges, by G. G. Andre; on harbour bars, their formation, and removal, by Henry F. Knapp; and on apparatus for utilising the waste heat of exhaust steam, by James Atkinson. The papers marked with an asterisk are those to which premiums of books were awarded. The volume is ably edited by Mr. P. F. Nursey, the secretary, and published by Messrs. E. and F. N. Spon, of Charing Cross. The society may certainly be congratulated upon their liberality in permitting those who do not possess the privilege of membership to purchase so useful and valuable a volume.

Registration of New Companies.

The following joint-stock companies have been duly registered:—

THE UNIVERSAL STEAM TRAMCAR CONSTRUCTION COMPANY (Limited).—Capital 100,000*l.*, in shares of 10*l.* To carry into effect an agreement made between J. Aspey and P. J. G. Rouquette of the one part, and F. A. Oliphant for the company, for an invention for "improvements in steam tramway cars," and to purchase, manufacture, or let cars on this principle. The subscribers (who take one share each) are P. J. G. Rouquette, 35, Finsbury Circus; J. Aspey, 22, Waterloo Bridge-road; T. Kent, Lee; F. A. Oliphant, 59, Mark-lane; G. A. Rouquette, 35, Finsbury Circus; H. J. Rouquette, 35, Finsbury Circus; J. S. Pereir, 9, Adam-street.

THE COVENT GARDEN HOTEL COMPANY (Limited).—Capital 20,000*l.*, in shares of 10*l.* To purchase of A. H. Mellon the Covent Garden Hotel, goodwill, furniture, &c., and to carry on said business. The subscribers are—A. H. Mellon, Southampton-street, 10; J. Rudd, Albion Hotel, 10; J. Brown, Brook Green, 20; G. Roussillon, 15, New Broad-street, 10; D. Christy, 92, Regent's Park-road, 20; H. Meyers, 16, Mark-lane, 5; T. Bartens, Inns of Court Hotel, 3; C. A. Bartholomew, 13 and 14, Finsbury Pavement, 20; W. Burr, 42, Poultry, 10.

THE TEMPERANCE CAFE COMPANY (Limited).—Capital 10,000*l.*, in shares of 10*l.* To acquire the business situate at 80, Lord-street, Liverpool, and to carry on and develope same. The subscribers are—W. Cruze, Liverpool, 10; M. Bebbington, Digburth, 10; J. Botting, Liverpool, 10; M. C. Buck, Liverpool, 10; J. G. Gillers, Liverpool, 10; T. H. Williams, Liverpool, 5; J. Hargrave, Liverpool, 1.

THE EMPRESS ENGINEERING COMPANY (Limited).—Capital 10,000*l.*, in shares of 5*l.* To acquire, by purchase or otherwise, the business heretofore belonging to E. J. Taylor and Co., Liverpool and London, with the goodwill, plant, &c., to carry on the said business. The subscribers are—J. Archer, Liverpool, 100; G. Evans, Southport, 50; W. E. Smith, Southport, 20; W. L. Lawson, Liverpool, 50; M. C. Glasier, Southport, 10; T. T. Thomas, Southport, 2; J. Witham, Southport, 5.

THE LANCASHIRE FIRE RE-INSURANCE COMPANY (Limited).—Capital, 25,0000*l.*, in shares of 5*l.* To carry on, in the United Kingdom or elsewhere, every description of fire re-insurance. The subscribers (who take 30 shares each) are—G. Shepperd, Bacup; T. E. Best, Bacup; T. Barrowclough, Bacup; J. Hargreaves, Bacup; D. Lord, Stacksteads; W. Ashworthy, Bacup; G. Hudson, Bacup.

THE EQUITABLE REVERSIONARY INTEREST SOCIETY, with a nominal capital of 500,000*l.*, in shares of 100*l.*, is registered as a limited company under the Companies Act of 1862.

THE PHŒNIX PEAT FIRE-LIGHTER COMPANY (Limited).—Capital 6000*l.*, in shares of 5*l.* To carry on the business of fire-lighter manufacturers, using peat or charcoal mixed or combined. The subscribers (who take one share each) are—W. R. Trevelyan, Hants; R. T. Head, Alplington; A. Carr, Exeter; R. W. Head, Exeter; F. Thomas, Exeter; G. W. Couch, Exeter; J. Talford, Exeter.

THE UPLEES BRICKFIELDS COMPANY (Limited.)—Capital 20,000*l.*, in shares of 5*l.* The immediate acquisition of the Uplees brickfields, belonging heretofore to J. S. Morgan, with the clay, chalk, sand, and other stone mines and minerals situate at Faversham, together with the plant, machinery, &c. Manufacturing and selling bricks, pipes, tiles, &c. The subscribers (who take one share each) are—T. Grover, Bridgemarsh; C. A. Wilkes, 100, Long Acre; J. S. Maughan, Turnham Green; S. H. Beckles, 43, Fish-street Hill; C. Griffin, Shepherd's Bush; P. J. Lowry, 28, Bridge-row; F. Philips, 16, Duke-street.

THE SOCIETY FOR PROMOTING THE EMPLOYMENT OF WOMEN.—Registered with limited liability, without the addition of "limited" to its name. The opening up of new employments to women, the income of the society being applied solely towards the promotion of its objects. The subscribers are—Victoria Grosvenor, 35, Park-street; Jessie Boucherett, 9, Upper Phillimore Gardens; Caroline A. Biggs, 19, Notting Hill-square; Charlotte A. M. Burbury, 15, St. George's-terrace; Charles W. Earle, 47, Cambridge-terrace; Robert Swan, 7, New-square; Thos. Hare, Kingston-on-Thames.

THE GROSVENOR CO-OPERATIVE STORES (Limited).—Capital 50,000*l.*, in shares of 10*l.* To purchase and sell all descriptions of goods, and to carry on the business of a co-operative society. The subscribers (who take one share each) are—T. S. Marshall, 3, Penniston Gardens; C. L. Schmitz, 26, Belsize Park Gardens; E. J. Jones, 27, Kildare-terrace; F. Scott, 41, Great Ormond-street; S. H. P. Bouverie, 3, Collingham-road; W. Price, 21, Mincing-lane; F. J. Box, 200, Mare-street.

NATIONAL CREDIT COMPANY (Limited).—Capital 20,000*l.*, in shares of 10*l.* To act as bankers, discounters, money lenders, and financial agents; to float in any country commercial, financial, insurance, &c., companies. The subscribers (who take one share each) are—T. G. Collier, Peckham; H. W. Fulliford, 142, Seymour-street; W. F. Casar, 9, Lower Kennington-lane; J. Puch, Clapham; W. Wieldon, Peckham; R. Norton, Camden Town; F. Bentley, South Hornsey.

THE KINGSTON COTTON MILL COMPANY (Limited).—Capital 210,000*l.*, in shares of 10*l.* To purchase or otherwise acquire the Kingston Cotton Mill Company, and to manufacture and deal in cotton, yarn, and other materials; to carry on the business of spinning, bleaching, &c. The subscribers (who take 100 shares each) are—A. Monat, Hull; G. G. MacTurk, Hull; W. Fisher, Hull; T. Horncastle, Hessle; C. Wells, Hull; H. P. Jackson, Hull; J. Lambert, Hull; I. J. Midgley, Manchester; W. H. Waite, Hull.

THE HOME AND COLONIAL MAIL COMPANY (Limited).—Capital 5000*l.*, in shares of 10*l.* To purchase the Colonial Empire and Star of India newspaper, and to carry on the business of newspaper proprietors, agents, publishers, &c. The subscribers (who take one share each) are—A. Lawry, 54, Highbury New Park; E. H. Walton, Brown's Buildings; A. H. Wheeler, 14, St. Mary Axe; R. A. Heath, Hammersmith; H. C. Glanville, Islington; M. J. Sullivan, 26, Brecknock Crescent; E. Wahab, 14, St. Mary Axe.

THE VICTORIA PATENT FUEL COMPANY (Limited).—Capital 70,000*l.* in shares of 20*l.* The manufacture of patent fuels, pitch, and oils. The subscribers (who take one share each) are—W. Jones, Western Moor; C. E. Peel, Swansea; M. P. H. Formby, Briton Ferry; W. Powell, Hirwain; C. Page, Briton Ferry; G. H. Davey, Briton Ferry, W. P. Powell, Hirwain.

THE SANITARY INSPECTION OF HOUSES AND BUILDING SOCIETY (Limited).—Capital 100,000*l.*, in shares of 5*l.* To purchase or otherwise acquire, maintain, lease, sell, &c., any property or buildings in the United Kingdom. The subscribers (who take one share each) are—J. C. L. Marsh, Greenhithe; F. A. R. Russell, 11, Down-street; L. Flower, 12, Finsbury-circus; F. Molyneux, War Office; J. Lewis, 29, Noble-street; H. T. Tubbs, 29, Noble-street W. K. Welch, Streatham Common.

THE BOROUGH WHARFS AND WAREHOUSES (Limited).—Capital 10,000*l.*, in shares of 5*l.* To purchase the business of wharfingers at 12 and 13, Bankside, Southwark and to carry on such business. The subscribers (who take one share each) are—J. Mason, 61, Moorgate-street; J. N. Harrington, Greenford; W. F. Harries, Croydon; F. Mason, 49, Peckham Grove; A. Menty, 59, Lincoln's Inn; H. Jordan, 37, Wallbrook; C. J. Clarke, 10, Delahey-street.

THE LANCASHIRE AND YORKSHIRE FIRE INSURANCE COMPANY (Limited).—Capital 250,0000*l.*, in shares of 5*l.* To carry on the business of an insurance company in all its branches. The subscribers are—W. Brown, Manchester, 100; J. W. Mellor, Stockport, 100; J. E Riley, Manchester, 100; S. Geldard, Manchester, 100; T. Bednal, Manchester, 25; F. B. Craig, Manchester, 25; G. O. Andrews, Manchester, 25.

PROTECTING IRON AND STEEL SURFACES.—As an improvement upon his patent of Feb., 1876, Prof. F. S. Barff patented (but the patent has become void by neglect to file a final specification) an invention which consists in the production of a protective coating or film of oxide or oxides of iron upon the surface of objects composed either of iron or steel by submitting such objects to the action of superheated steam.

IMPROVEMENTS IN CLEANING SMALL COAL.

Fig. 1.

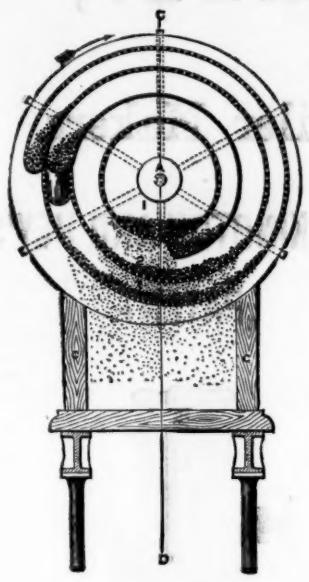
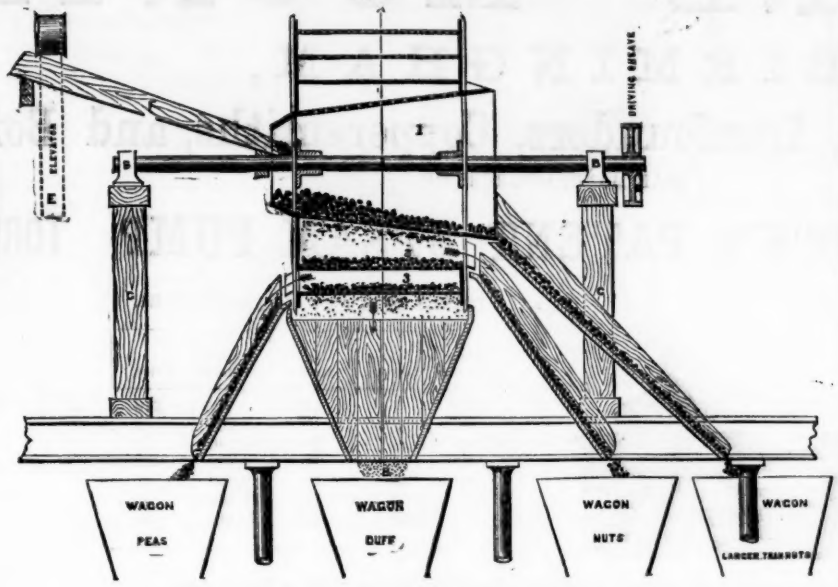


Fig. 2.



IMPROVEMENTS IN CLEANING SMALL COAL.

Some time since reference was made in the Journal to improved machinery for separating and cleaning coal, the invention of Mr. SCHMITT, and which has for some time past been working satisfactorily in the Westphalian coal field. As the machine is now being introduced into this country, many will be glad to learn the full details of construction, which are very readily obtainable from a paper recently read before the North of England Institute of Mining Engineers. The accompanying engravings and particulars relating to the invention have been kindly supplied by Mr. Alexander Dick, of Cannon-street, who represents the inventor in this country.

The development of the spiral screen shown in Figs. 1 and 2 is simply a long strip of plate perforated throughout its length with holes of different sizes wound into a spiral, with the ends closed and mounted on a central axle. Fig. 1 represents a section through the axis of a spiral screen, and Fig. 2 a cross section. A is the axle or shaft on which the screen is mounted, and with which it revolves; BB are carriages (in which the bearings of the axle work) carried upon the frames CC at each end; D is the driving sheave round which a belt passes from the engine-shaft; E is the elevator lifting the coal, ore, cement, sand, or other material which is to be sifted to the inclined spout F, which conveys it into the central portion of the screen 1, which is a cone-shaped circle, being larger in diameter at its outer end to facilitate the delivery of the larger pieces of coal which will not pass through the first series of holes. The whole of the other material (passing through these holes) falls into the second division of the screen 2, and by the revolution of the screen is separated; the pieces too large to pass through the second series of holes being retained upon the plate until that point comes round where a channel, 2, receives them, down which they are discharged out at the side of the screen into depots or by spouts into wagons. The pieces which have passed through the second series of holes in the division 2 fall into the third division 3, and as the screen revolves they are further separated, the pieces which will not pass through the third series of holes being retained until the channel 3 comes round, down which they run, and are discharged by spouts into wagons as before. The smallest pieces have during this time passed through the holes in division 3, and are delivered out of the whole of the bottom portion of the screen into a hopper leading by a spout to the wagon. The unperforated or blank plates shown by the full dark lines are to prevent the material from being returned after passing through the holes, as the delivery through the side channels 2 and 3 takes place partially at or above the horizontal centre line of the screen, and not entirely out of the lowest segment of the circle as in ordinary drum screens. The perforated plates forming the screen are put on in segments, and, when required, can easily be removed or replaced with plates having larger or smaller holes by taking out a few bolts. The extent of surfaces and the sizes of the holes in a screen will depend upon the nature and composition of the material to be screened, and the sizes into which it is to be separated.

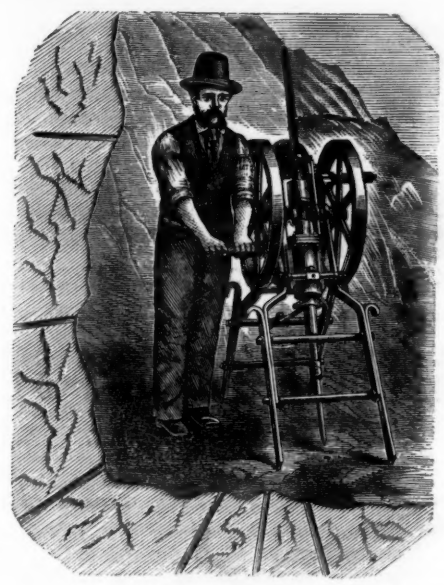
One great recommendation of the machine is that it is continuous in its action, and at the same time economic. The size of a spiral screen to separate 400 tons of coal in 10 hours would be 8 ft. in diameter, 4 ft. in length; it is formed by a strip of iron plate about 54 ft. long and 4 ft. wide, wound into a spiral, the plate having perforations throughout its length of different sizes, according to size of coal required to be separated. The mode of separating and cleaning the coal in Germany is to pass the whole as it comes from the pit over an ordinary inclined screen, which delivers the large coal on to a travelling belt at the bottom of the screen; on this belt the coal is cleaned by picking out the stones, slates, &c. At the further end of the belt it falls into wagons, and is ready for market. All the small coal which has fallen through the bars of the inclined screen is then raised from a hopper by an elevator to the spiral screen, from whence the sizes larger than "duff" are delivered into pulsating washing machines. The coal floating off the surface is passed over strainers to drain it, and is then run down into depôts or into wagons to be taken to market, the refuse slate, pyrites, &c., being carried away by creepers into tubs. The smaller coal next in size to "duff" is taken to a disingrator and crushed preparatory to its being coked, and the "duff" which has not been washed is also crushed, and afterwards made into coke.

It need scarcely be mentioned that the screen is quite as applicable to the treatment of metalliferous minerals as of coal. In Germany it has given great satisfaction, and amongst the chief advantages to be obtained from its use it may be mentioned that the cost is smaller than that of ordinary revolving screens, and the space occupied in proportion to the work done is very much less; that the material, such as coal, is not broken in the process of screening nearly so much as in ordinary revolving screens, while the screening into the required size is most efficiently done; that the construction is simple and strong; all parts readily accessible and easily repaired; and that the power required to drive it is much less than with ordinary revolving screens, as the material being screened is more distributed and does not all lie at the bottom of the screen. The invention is well worthy of the careful inspection of both colliers and metalliferous miners.

NEW FURNACE BUILDING MATERIAL.—The invention of Mr. W. H. WATERFIELD, of Upper Gornal, Staffordshire, has for its object the use of Gornal freestone, Gornal silica, and Gornal sand in the construction and repairs of puddling furnaces, mill furnaces, ball furnaces, heating furnaces, and all furnaces used for the purpose of heating and smelting iron in mills and forges. And the invention consists in the adaptation and application of Gornal freestone, Gornal silica, and Gornal sand, to the construction of bridges, back walls, sides, jambs, necks, and flues, of the above named furnaces in order to enable such parts or portions of the furnaces to resist more effectually the action of the heat to which they are exposed in the ordinary use and working of such furnaces. The said Gornal freestone may be used either in blocks to form the masonry of the said parts or portions of furnaces, or if preferred it may be ground and mixed with Gornal silica and Gornal sand, and formed into bricks, which can be used in the same manner as the said blocks of freestone.

THE HAND-POWER ROCK-DRILL.

It has frequently been objected with regard to the introduction of rock-drills in connection with industrial mining that, although greater speed is unquestionably obtained, so large a first outlay is necessary that the majority of small mines are unable to avail themselves of them, and it was especially to meet this objection that the hand-power machines, introduced by Messrs. Jordan, Son, and Meihé, of Queen Victoria-street, and which have frequently been noticed in the *Mining Journal*, were designed. The above engraving represents the latest improved apparatus—Jordan's Dead-Blow Hand-Power Rock-Drill—which is now being introduced by the firm, and which, to judge from the testimonials received concerning it, is a very efficient machine. A working model of the drill was exhibited at the conversazione of the President of the Institution of Civil Engineers, noticed last week, and a full-size machine, which has been at work for some time past at the Millwall Docks (purchased by the company) will be inspected there by the Society of Engineers one day this month.



It appears that the inventors completed some valuable improvements (embodied in new patents) about June last year, which have since formed part of all their drills, and to judge from the many testimonials and satisfactory reports received these machines are establishing their reputation as efficient and practical appliances for all operations where rock-boring is required, and fulfil what the inventors claim for them. Mr. Richard Taylor (of Messrs. John Taylor and Sons) states that the hand-power rock-drill supplied to the works at Couëron, near Nantes, seems likely to prove a very useful implement in their granite quarries. Their engineer reports that it bores 1¼ holes in granite at the rate of 1 in. per minute worked by two men. No difficulty is found by them in keeping up continuously that rate, a third man relieving one of the others from time to time. Mr. G. R. Birt, the general manager of the Millwall Docks Company, states that the drill has been employed with great success. A large number of holes, 1¾ inch diameter, were drilled in their Bramley Fall stone coping to receive the chair-bolts of a line of railway. The holes were perfect. The cost was represented by the wages of two unskilled labourers and one machinest, and that of the sharpening of the drills. The speed and economy with which this work has been done by the hand-power rock drill proves the great saving that can be effected by its use over ordinary direct hand labour.

But the most important results are those shown at the Neuer Wildberg Mines, in Germany. The managing director—Mr. P. H. Knops—reporting upon the subject, states that on Jan. 27 driving with the machine was commenced. He put on three men per shift, and worked two shifts per day, equal to 16 hours daily only. In four days they worked, therefore, eight shifts, and obtained an advance of 3·2 metres (10 ft. 6 in.), including clearing of debris, costing them at 2·40 marks (2s. 5d.) per man per shift only 18 marks per metre (16s. 7d. per yard). If this be compared with hand labour it will be seen that by hand in 63 shifts, with six men, two per shift, the level advanced 8·6 metres, at a labour cost per metre of 34·32 marks; by hand in 24 hours, with six men, two per shift, the level advanced 1 ft. 4 in., at a labour cost per yard of 32s. 7d.; by machine in 16 hours, with six men, three per shift, the level advanced 2 ft. 7½ in., at a labour cost per yard of 16s. 7d.

In the first days of February they encountered, instead of the ordinary grauwacke, and extraordinarily hard grauwacke, and the work done with the machine during 47 shifts, with three men per shift, was 12·4 metres (40 ft. 6 in.), equal to an advance of 52·68 centimetres (1 ft. 8¾ in.) in 16 hours, with six men, including clearing of debris. To test the hardness of this rock he let the men bore by hand for a few shifts, and all one man could do during eight hours was one hole of about 40 centimetres (15¾ in.) deep, including blasting, for which he blunted about 15 tools. The writer further states that with the machine he finds a not unimportant saving in the use of the tools, as he now only requires (in the hardest grauwacke) half the number of tools (10 to 12 per shift) compared with hand labour (for which 20 to 24 had to be used), and these only suffer in the blade. As regards the blade, he originally followed Messrs. Jordan's instructions, and used S X and Z tools, but he has since come back to well-made chisel-shaped tools, which form they have employed since February with success. The erection and changing of position of the machine the men now get through easily in five to nine minutes, and they have become so familiar with it that for some time past they have bored all the holes with the machine, and the hand labour consists of breaking off and clearing the loose rock only.

As the above figures show that in a given time the drill can do twice the amount of work (*i.e.*, advance of level-driving) at half the price compared with ordinary hand-labour no further recommendation can be required.

THE TERRIBLE MINE, COLORADO.

ONE OF THE GREAT TREASURE VAULTS OF CLEAR CREEK COUNTY.

Operations are continuing on the Terrible and connected properties with a working force of a little over 100 men, including lessees, contractors, and those who are working for day's wages under the company. The principal features of development progressing at this time is the sinking of the Silver Ore and Terrible shafts. These are something over 500 ft. apart, the former being 168 and the latter 128 ft. below the level of the Union Tunnel. Without knowing the exact figures we estimate the depth of the Silver Ore shaft at 700 ft. below the surface of the mountain perpendicularly. This shaft carries some ore in the bottom, and probably all the way down, but circumstances were not favourable at the time we visited the mine for an accurate examination of the ore vein. This shaft has been sunk in a good body of stoping ground however, and to all appearances that part of the Terrible lode lying on the east side of the Silver Ore shaft, extending from 100 to 200 ft., and bounded on the upper side by the Union Tunnel, is the sheet anchor of the Colorado United Mining Company, as far as the Terrible lode is concerned, though we are not in possession of precise information at present in regard to the other lodes owned by the same company. A number of lessees are at work on the Brown and Chelsea Beach lodes, and we hear that many are doing well, but definite results are not given. In company with Mr. J. B. Corneille, the foreman of the properties, we inspected that part of the eighth level lying between the Silver Ore and the Terrible shafts, where stoping is progressing about 130 ft. east of the former shaft on from 2 to 3 in. of ore, nine drills being used at this point. The drift west of this stope as far as the shaft shows a fairly continuous vein of ore, which at some points is from 6 to 10 in. in width, and appears to be of good quality. No stoping is in progress west of the Silver Ore shaft, though the drift is being continued in that direction, the breast of the drift being 165 ft. west of the shaft.

The concentrating ore which has been accumulating on the stulls in the fifth and sixth levels is being taken out and dressed at the company's concentrating works, which are running steadily and satisfactorily. But three men, besides Mr. Thos. Carkeek, the foreman of the mill, are employed to keep the machinery running, and one of these is the trammer, who runs the ore from the ore house to the crushing floor, a distance of about 50 ft. Here it is shovelled into a Blake crusher, and falls between a pair of Cornish rolls 30 in. in diameter with 14 in. face. There is a Dodge crusher on the same floor, but it is not necessary to use it at this time. From the rolls the crushed ore is elevated to a revolving screen just above, having three meshes to the lineal inch. The coarse mineral is run down to a pair of 20 by 12 in. rolls, to be crushed and returned to the screen again by a horizontal screw conveyor, and subsequently by an elevator. The fine mineral is run down into a still finer screen, where the process of separation is aided by a stream of water running into the screens. The coarse portion—that which the screen retains—is now run down long conveying troughs into the basement of the building, where the Hartz jigs are situated, and the process of concentration really commences. In order to give a clear idea of the manner in which this is effected, we may mention that the revolving screens are three in number. The fine mineral from No. 2 screen runs down into a jig suited to that size of rock, the meshes of the jigs corresponding in size to those of the screens. The still finer ore passing through the No. 2 screen is also carried down to a jig adapted to that size, and so on until the product of all the screens is transferred to the jig-room.

Each jig is divided into four compartments, so that as the water flows through the first division it carries the lighter material into the next, which is an inch or two lower than than the first, and so through the different divisions to the other end. The result of this is not only the elimination of the refuse material, consisting principally of gangue, but also the division of the concentrated ore into different grades of quality, though but two kinds are recognised here, the first box receiving nearly pure argentiferous galena and the second a mixture of iron pyrites and zinc blende, which is of less value than the lead ore.

The room contains six jigs, though but five sizes of ore are made, two of them running on one size. The jigs, with the exception of the two just named, make a division of the ore in regard to size, while the departments of each jig make a distinction in regard to quality. The meshes of the finest jigs are exceedingly small, passing particles of ore about the fortieth part of an inch in diameter. As the separation of the ore from the refuse depends entirely on specific gravity, this sizing of the mineral is a very important and essential feature in ore concentration.

From the jigs the lighter washings of mineral which are not entirely valueless are elevated into two Rittenger percussion slime tables, where the fine sandy particles of galena are separated from the worthless slime, and with the further concentration of this by the aid of buddles the process is completed. The ore is then taken from the boxes, whenever it has accumulated in sufficient quantities, and is drained and dried, and is ready for shipment.

At present the concentrating machinery is run by a 22-inch turbine water-wheel, although a 75-horse power engine is on hand ready for use when needed.

The dump at the mouth of the Union Tunnel is being confined by substantial cribbing, preparatory to building a drying and changing house for the workmen, which will be covered with corrugated iron in the same manner as the dressing works. A car track will also shortly be laid from the mouth of the Union Tunnel to the dressing works, which will greatly facilitate the transfer of mineral between those points.

THE EAST TERRIBLE.—That portion of the East Terrible leased by Dr. Leman continues to turn out ore about as usual, which however, is considerably harder and more solid than that taken out some months ago, consisting mainly of galena and zinc, and carrying tetrahedrite and iron pyrites.

80 ft. below the tunnel level a drift is progressing easterly on about 3 in. of ore. West of the shaft, at a depth of 50 ft., the vein is opened by a drift from 50 to 60 ft. long. The breast carries from 2 to 6 in. of ore mixed with quartz, and the back of the stope on the same drift shows 2 to 3 in. of good grade ore. The general grade of the mineral is from 400 to 500 ozs. for first-class, and from 125 to 150 ozs. for second-class. Ten men are employed in this ground.—*Colorado Miner*, May 10.

PRUSSIAN MINING STATISTICS.—An official return sets down the entire amount of mining produce in the kingdom of Prussia during the year 1877 at 933 millions of centners in weight (41,651,785 tons 14 cwts. 32 lbs.), and 278 millions of marks (13,900,000*l.*) in value. The term "mining" is, however, employed in a more extended sense than we are accustomed to in England, since it includes even the digging out of peat. The chief heads of produce are given, in round numbers, as follows:—Coal, 673 millions of centners, value 186 millions of marks (9,300,000*l.*); peat, 172 million centners, value 1,450,000*l.*; iron ores, 55 million centners, value 850,000*l.*; zinc ores, 11 million centners, value 550,000*l.*; copper ore, six million centners, value 350,000*l.*; sulphur-pyrites, two million centners, value 75,000*l.*; lead ore, two million centners, value 34,150*l.*; asphalte, 28,000*l.*; rock salt, 24,750*l.*; manganese ore, 9300*l.*; silver and gold ores, 1050*l.*; nickel ore, 175*l.*; vitriol and alum ores, 2500*l.* The same official returns give the mineral products of various kinds of the Principality of Waldeck at 54,000 centners, value 1092*l.*

SALE OF PEDN-AN-DREA MINE MATERIALS.—Pursuant to an order made in the Stannaries Court, the greater portion of the materials were submitted to public auction by Mr. W. J. Clyma, of Truro, and there was a large attendance. The materials were offered at first in one lot, but the only bid was one of 1000*l.* from Mr. James Jenkins, of Redruth, Mr. Kendall, for the Registrar of the Stannaries Court, stating the reserve price to be 2500*l.*, the materials were not sold. A 70-in. pumping-engine, 9-ft. by 8 ft. stroke, with four 10-tons boiler was next offered, but for this there was no bid. The stamping engine and boilers were not offered. The horizotal engine, 23-in. cylinder, 4¼-ft. stroke, with two boilers, 10 and 8 tons, was offered, but there was no bid. A12-in. steam-engine, 2-ft. stroke, and Blake's patent stonebreaker were sold by private contract. Shears and two pulleys were sold for 5*l.* 10s. A 10-armed capstan was offered, and 4*l.* 5s. bid, but the reserve being 8*l.*, it was not sold. Several hundredweight of steel wire-rope was offered, but only one bid of 5s. per cwt. was made, and none was sold. The balance-bob, all complete, realised 7*l.*; stays, stands, and poppet-heads fetched 4*l.*, worth at least 20*l.*; iron skips fetched 10s. each, worth from 30s. to 40s.; iron tram wagons were sold for 10s. each, and the entire skip-road down the shaft for 10s., worth five times the money. Several lots were sold to the adventurers of Wheal Peevor, including, tackle-brace, &c., round Cobbler's shaft for 17*l.* 10s.; wood roadway and stand from engine to Cobbler's shaft, including everything, for 36*l.*, which could not have cost less than 250*l.*; screening irons for 7*l.* 15s. by Harvey and Sons; tackle brace and everything connected round western shaft, 17*l.* 10s., worth at least 150*l.* Nine 8-in. pumps were offered, but no bid. For 14-in. pitwork 1s. 6d. per cwt. was the only bid, and none was sold. Strapping plates were offered, but no one bid for them. The principal lots were sold to adventurers of Wheal Peevor, South Condurrow, and South Dolcoath. Years ago such a lot of good machinery would have realised more than five times the prices offered.—*West Briton.*

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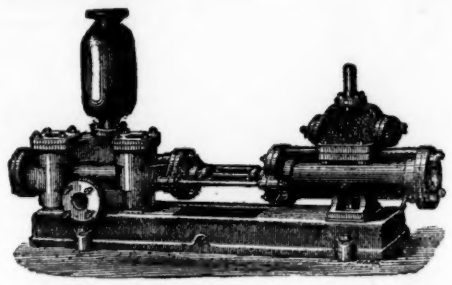

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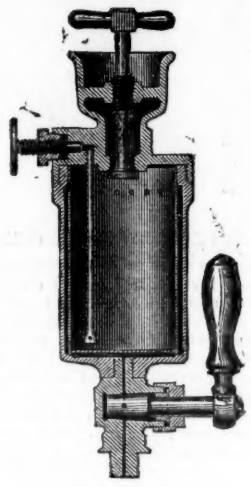

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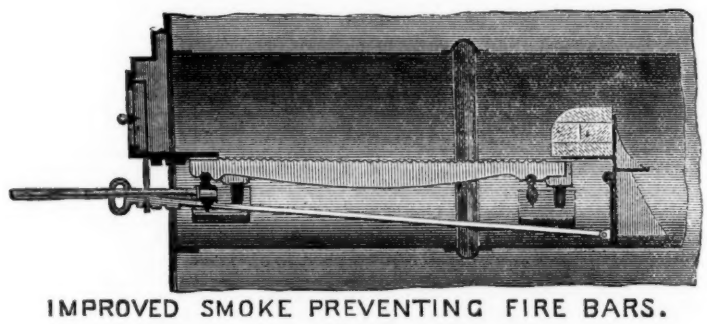

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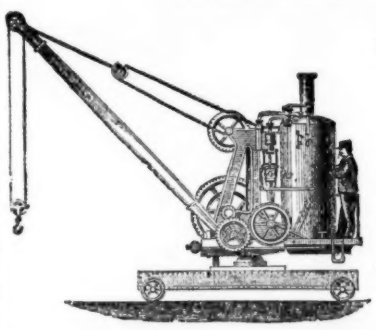

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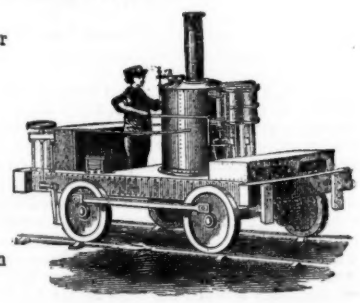

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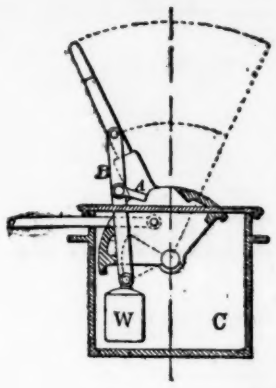
SWITCHES AND CROSSINGS

FOR RAILWAYS AND TRAMWAYS, WITH PATENT LEVER BOXES.



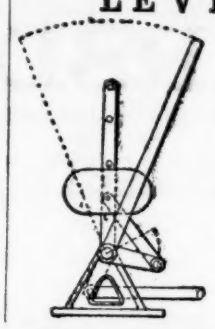
Hartley's Patent Lever Box,

REVERSIBLE UNDERGROUND,

Can be set to work either way; by turning over the catch at A and reversing the lever, the weight W swings over to C, the catch preventing its return until again turned over. The reversing is effected with very little power, as the weight is raised but a few inches in the operation.

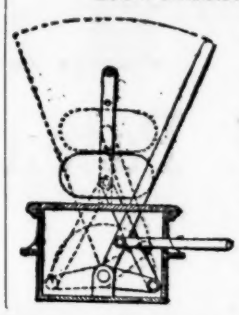
HARTLEY'S PATENT

LEVER BOX.



Specially designed for Colliery Workings, or where economy of space is an object. Is reversible, and can be locked either way, or dead-locked, so as not to work at all.

Hartley's Patent Locking and Reversible Lever Boxes,



HALF UNDERGROUND,

Will set over both ways, can be locked so as to work on one side only, or the switches can be locked on either side, so as not to work at all. Takes up less room than any other, as the weight does not turn over; works equally well if full of water; can be supplied at the price of an ordinary lever box.

Tank Locomotives, Siding Stops, Wheels, Rails, Chairs, Spikes. Bolts,

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Iron and Steel Pit Cages, Wrought-iron Roofs, Headgears, Girders, Turntables, Patent Coal Tip, Boilers, Engines, Water Cranes.

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PARIS, 1878.

THE COMPOUND

DIFFERENTIAL PUMPING ENGINE

Is largely adopted for Mining and all Pumping purposes. It secures great economy in fuel and maintenance. H., D., and Co. have patterns for all sizes, from 5 to 500-horse power, and can supply very powerful Engines and Pumps at a short notice.

HYDRAULIC PUMPING ENGINES for all purposes where water pressure is available.

AIR-COMPRESSING MACHINERY for Rock Drilling and Underground Haulage, &c.

MINING MACHINERY OF ALL KINDS.

WINDING ENGINES, BLOWING ENGINES, CORNISH PUMPING ENGINES, PUMPS, ETC.

HATHORN, DAVEY, AND CO.,

ENGINEERS, LEEDS.

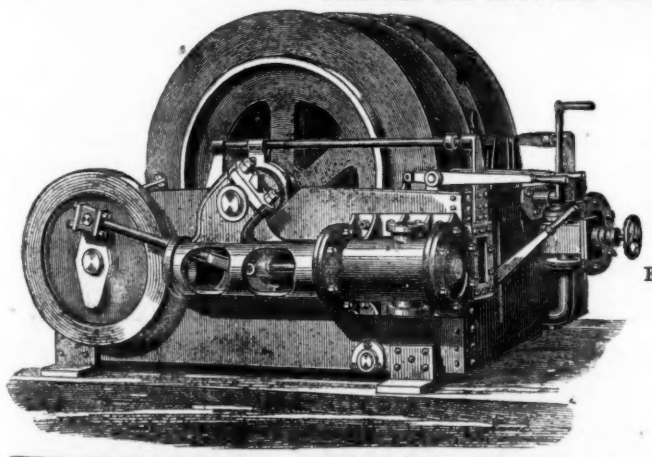
CATALOGUES ON APPLICATION.

STEVENS' PATENT UNDERGROUND WINDING ENGINE,

DESIGNED FOR USING COMPRESSED AIR OR STEAM,

SIMPLE, COMPACT, PORTABLE.

Silver Medal, Royal Cornwall Polytechnic Society, 1876.



No. 1 size, 7 in. single cylinder, with 2 ft. drums.
No. 2 size, 9 in. single cylinder, with 2 ft. 6 in. drums.
Larger sizes made with two cylinders.

A,—	6 in.	double cylinder, with	2 ft. 3 in. drums.
B,—	8 in.	" "	3 ft. 0 in. drums.
C,—10 in.		" "	3 ft. 6 in. drums.
D,—12 in.		" "	4 ft. 6 in. drums.

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(LIMITED),

MARKET PLACE CHAMBERS, 22, MARKET PLACE, MANCHESTER.

RICHARD MOTTRAM, Secretary.

For the Sale of the "Burleigh" Rock Boring Machinery, and also for Sinking Shafts, Cutting Tunnels and Levels, and General Rock Blasting Operations by Contract.

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" J. W. PEASE AND CO., Darlington.
" THE DOWLAIS IRON COMPANY (LIMITED), South Wales.
" THE EBBW VALE STEEL, IRON, AND COAL COMPANY (LIMITED), South Wales.
" THE CRUMLIN VIADUCT WORKS COMPANY (LIMITED), South Wales.
" T. T. J. WALLER, Esq., Railway Contractor, Gisburn, near Skipton.
" TURNER AND SON, Limestone Quarries, Kiverton Park, near Sheffield.
" THE CLIFTON AND KERSLEY COAL COMPANY, near Manchester.
" THE ST. BRIDE'S WELSH SLATE AND SLAB COMPANY, Haverfordwest.
" THE WARTON LAND COMPANY (LIMITED), Silverdale, near Carnforth.
" THE MONTIPONI SOCIETY, Turin, Italy.

The following letter has recently been received from the Ebbw Vale Company:— Ebbw Vale Works, Monmouthshire, July 5th, 1878.

GENTLEMEN,—I have much pleasure in stating that in the execution of your contract to drive, for the Ebbw Vale Steel, Coal, and Iron Company (Limited), a cross measure Drift from the Old Coal to the Rock Vein Coal, in the Glyn Pits, at Pontypool, you did so with dispatch, and to the entire satisfaction of all concerned. The distance driven was 453 yards in about 13 months. Yours faithfully, ROBERT JORDAN, Mining Engineer,
[The size of the above heading is 9 ft. by 13 ft.] Ebbw Vale Company's Collieries and Mines.

The "Burleigh" Machinery can be seen in operation at Manchester any time, by giving a few days' notice to the company.

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LLANELLY, S. WALES,

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Steel-pointed Spades and Shovels, Draining and Grafting Tools, &c.

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To which special attention is given.

RABBLE HEADS, PADDLES, AND EVERY DESCRIPTION OF LIGHT HAMMERED WORK.

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F. M. F. CAZIN,

MINING AND CIVIL ENGINEER,

At BERNALLILLO, NEW MEXICO, U.S. OF AMERICA,

Has 24 years' experience in Mining and Smelting, and 10 years' experience in American Business and Law, offers his services at moderate charges for Reporting on Mining and other Property in any of the above-named States or Territories; gives correct, safe, and responsible advice as to securing full titles and possession; and, as to best mode of utilising the property, will assist in settling existing difficulties by compromise, and in disposing of developed mining property when held at real value; offers his assistance for securing undeveloped mining properties at home prices. As to care taken in reporting, reference is made to the *Mining Journal* Supplement, April 1, 1876, containing report on property of the Maxwell Land Grant and Railway Company; as to technical standing, to the prominent men of the trade—compare *Mining Journal* of Aug. 30 and Nov. 31, 1872, and *New York Engineer and Mining Journal*, Feb. 28, 1874.

£2000 SECURE ONE QUARTER INTEREST IN A PAYING COPPER MINING and SMELTING BUSINESS.

The UNDERSIGNED has succeeded in securing the right of working, and an interest in, a COPPER MINE, which by actual development and test has proved capable of an almost unlimited production of ore, containing in the great average more than 10 per cent. copper. He has ready on the ground 1000 tons of ore, a good steam-engine and boiler, a good blower, 7000 bushel of charcoal, and all the material requisite for the construction of furnaces, and a good house to live in. Has a coal mine of his own at eight miles distance, and the right for timber on a large tract of land, and can turn out copper in less than a month, at a cost of $150 per ton, including freight to New York. But he desires, for two good reasons, a PARTNER:—

1.—He is isolated, no man of culture being on less than 18 miles distance, and the nature of the business requires the presence of two partners.

2.—He needs the £2000 in part to pay therewith a balance on his interest, so as to begin clear of debt, and in part as working capital to stock the sale-store with.

Mr. B. MIDDLETON, of this Journal, will on personal application give some more particulars, and is also authorised to select among applicants.

No technical education is required, but a gentleman of commercial ability would be preferred. No time should be lost in making application, as the selection will be telegraphed within a few days.

F. M. F. CAZIN,
Mining and Civil Engineer.
Copperfield, near Bernalillo, New Mexico, U.S.A.

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THE GOLD MEDAL, THE SILVER MEDAL, AND HONOURABLE MENTION

FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS

Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

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ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE'S

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NEW PATENT STEEL TOGGLE BEARINGS.

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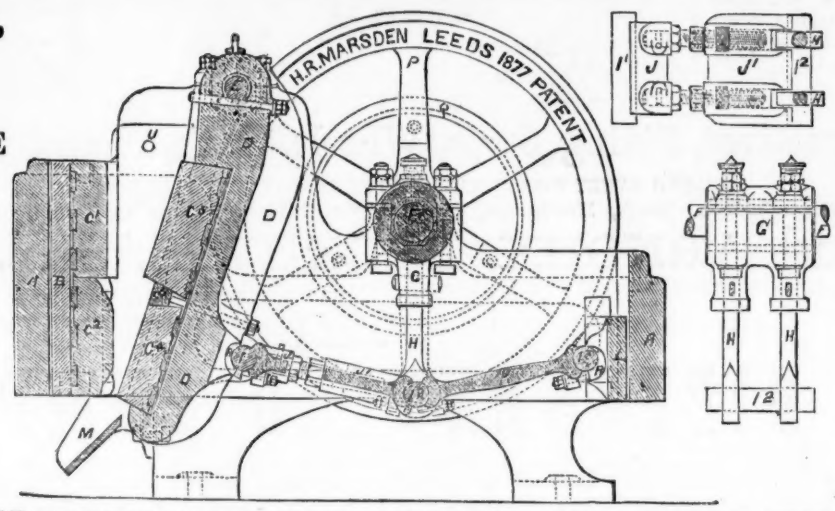

READ THIS—

Wharthole Lime Works, Maryport, Whitehaven, November 7, 1873.

H. E. MARSDEN, Esq., Soho Foundry, Meadow-lane, Leeds.

DEAR SIR,—The machine I have in use is one of the large size, 24 in. by 12 in. The quantity we are breaking daily with this one machine is 250 tons, the jaw being set to break to a size of 2½ in. We have, however, frequently broken over 300 tons per day of ten hours, and on several occasions over 360 tons during the same period. The stone we break is the blue mountain limestone, and is used as a flux in the various ironworks in this district. We have now had this machine in daily use for over two years without repairs of any kind, and have never had occasion to complain of any inconvenience in using the machine. I hope the one you are now making for me may do its work equally well. The cost—INCLUDING ENGINE-POWER, COALS, ENGINEMAN, FEEDING, and all EXPENSES OF EVERY KIND—is just 3d. per ton. Should any of your friends feel desirous of seeing one of your machines at work, I shall have much pleasure in showing the one alluded to.

I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

Wharthole Lime Works, Aspatria, Cumberland, July 11th, 1878.

H. R. MARSDEN, Esq., Soho Foundry, Leeds.

DEAR SIR,—We are in receipt of your letter of 4th inst. I may just state that the stone breaker above named has been under my personal superintendence since its erection, and I have no hesitation in saying that it is as good now as it was five years ago.

I am, dear Sir, yours faithfully,
FRANCIS GOULD.

GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

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H. R. MARSDEN will EXHIBIT in OPERATION his latest PATENT IMPROVED STONE-BREAKER AND ORE-CRUSHER—Size 12 × 7.

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SUPPLY their CELEBRATED ROCK DRILLS, AIR COMPRESSORS, &c., and all NECESSARY APPLIANCES for working the said Drills.

Their DRILLS have most satisfactorily stood the TEST of LONG and CONTINUOUS WORK in the HARDEST KNOWN ROCK in numerous mines in Great Britain and other countries, clearly proving their DURABILITY and POWER.

The DRILLS are exceedingly STRONG, LIGHT, SIMPLE, and adapted for ends, stopes, quarries, and the sinking of shafts. They can be worked by any miner.

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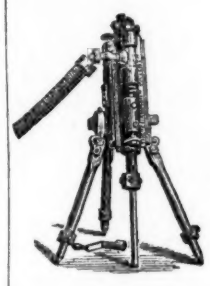

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Full particulars of rapid and economical work effected by this machinery, on application.

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PARIS EXHIBITION,

1878.

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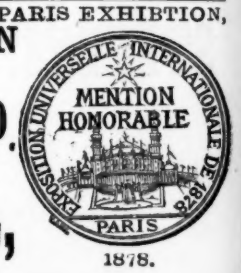

1878.

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